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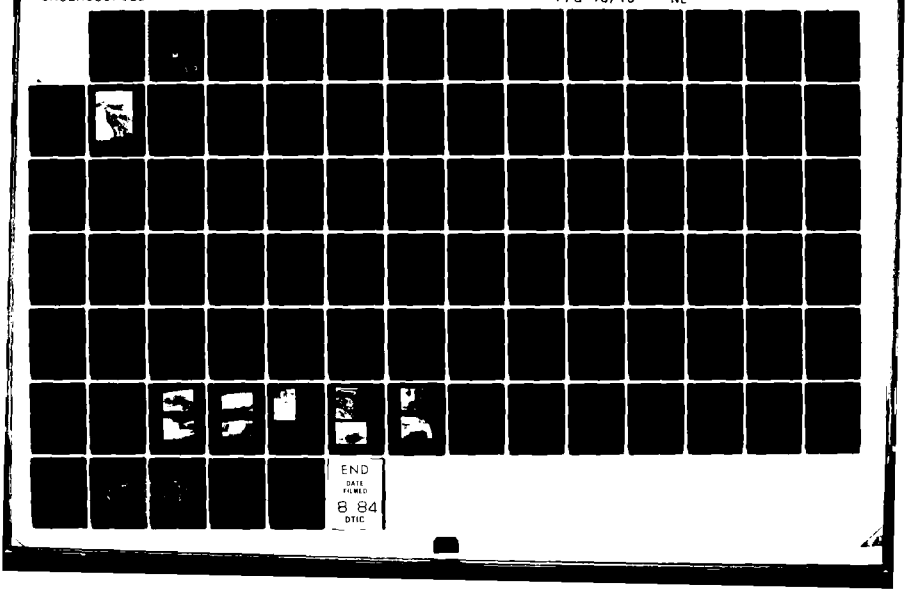

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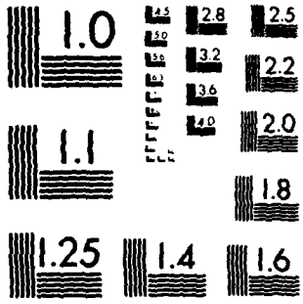

NAUGATUCK RIVER BASIN
SEYMOUR, CONNECTICUT

KINNEYTOWN DAM
CT 00089

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JANUARY 1980

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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4. TITLE (and Subtitle) Naugatuck River Basin Seymour, Conn., Kinneytown Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
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9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Naugatuck River Basin
Seymour, Conn.
Kinneytown Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Kinneytown Dam is a run-of-the-river dam across the Naugatuck River and consists of a concrete ogee spillway section with a crest length of 413 ft. The maximum height of the dam is 32.5 ft. A railway embankment forms the left abutment and an earth embankment approx. 50 ft. in length connects the right training wall to the right abutment. The low level outlet or blowoff consists of a 48 in. cast iron pipe through the left end of the spillway controlled by an upstream sluice gate. A diversion intake structure and canal located to the left of the dam and separated from the river by a railroad embankment diverts water from the impoundment to a downstream pond.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF
NEDED

MAR 06 1980

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

Inclosed is a copy of the Kinneytown Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, Anaconda American Brass Company, Waterbury, Connecticut.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

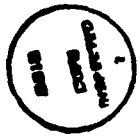
Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

KINNEYTOWN DAM
CT 00089

NAUGATUCK RIVER BASIN
SEYMOUR, CONNECTICUT



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

IDENTIFICATION NO: CT 00089

NAME OF DAM: Kinneytown Dam

TOWN: Seymour

COUNTY AND STATE: New Haven County, Connecticut

STREAM: Naugatuck River

DATE OF INSPECTION: December 13, 1979

BRIEF ASSESSMENT

The Kinneytown Dam is a run-of-the-river dam across the Naugatuck River and consists of a concrete ogee spillway section with a crest length of 413 feet. The maximum height of the dam is 32.5 feet. A railway embankment forms the left abutment and an earth embankment approximately 50 feet in length connects the right training wall to the right abutment. The low level outlet or blow-off consists of a 48-inch cast iron pipe through the left end of the spillway controlled by an upstream sluice gate. A diversion intake structure and canal located to the left of the dam and separated from the river by a railroad embankment diverts water from the impoundment to a downstream pond, where it is used to generate electricity and for processing purposes for a downstream manufacturing plant.

Based upon the visual inspection and a review of all available pertinent data, the dam is considered to be in fair condition. The erosion and undermining of the spillway apron, deterioration of the

concrete of the spillway, aprons, and training walls, seepage downstream of the left training wall and through the right training wall, deterioration and lateral movement of the left sheet pile wall, and tree growth on the earth embankment require further investigation or attention.

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the dam is classified as "Intermediate" in size with a "Low" to "Significant" hazard potential. A test flood equal to one half of the Probable Maximum Flood was selected in accordance with the Corps of Engineers' Guidelines. The calculated test flood outflow of 63,000 cfs would overtop the dam by 0.3 feet. The spillway capacity with the water level at the top of the dam is equal to 59,000 cfs or 94% of the test flood.

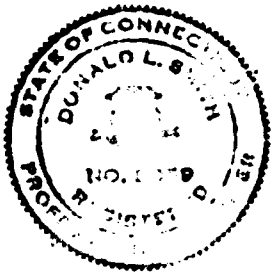
It is recommended that the owner engage the services of a qualified registered engineer experienced in the design of dams to investigate the erosion, undermining, and spalling of the spillway apron; the seepage at the left abutment; the condition of the sheet pile wall downstream of the left training wall; the erosion, undermining, and efflorescence of the right training wall; and the removal of the trees and root systems from the earth embankment.

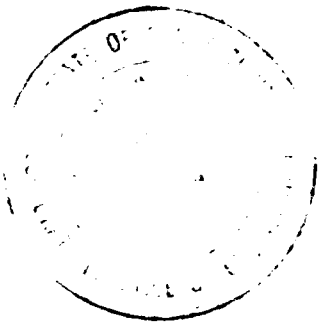
In addition, a program of annual technical inspections by qualified registered engineers should be instituted, an operations and maintenance manual should be prepared, and a formal warning system should be put into effect.

The owner should implement the recommendations as described herein and in greater detail in Section 7 of the Report within one year after receipt of this Phase I Inspection Report.

Donald L. Smith,
Project Engineer

Roald Haestad,
President





This Phase I Inspection Report on Kinneytown Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

ARAMAST MANTESIAN, MEMBER
Foundation & Materials Branch
Engineering Division

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

RICHARD DIBUONO, CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRIAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the

condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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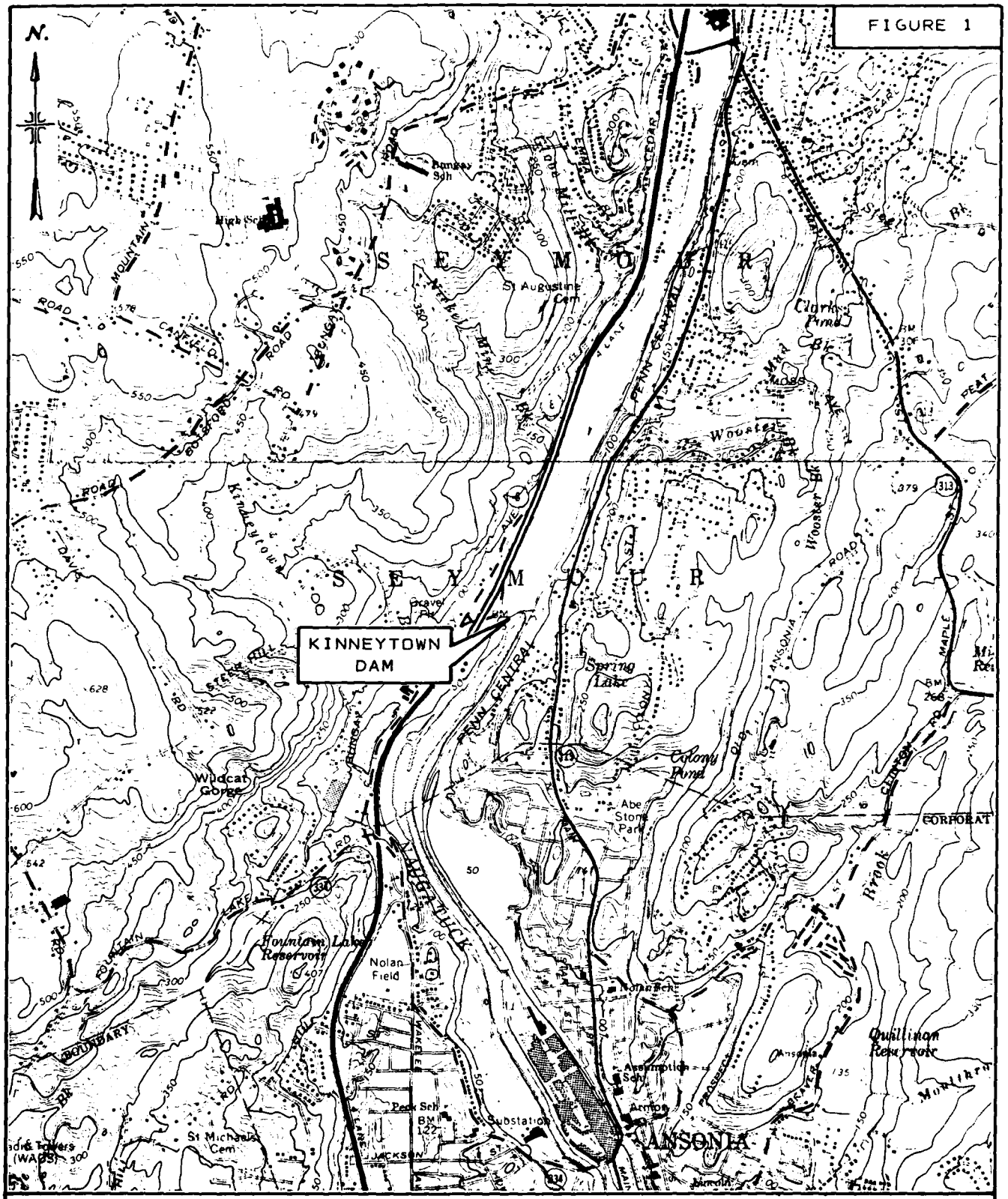
OVERVIEW PHOTO

U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	KINNEYTOWN DAM - CT 00089 NAUGATUCK RIVER SEYMOUR, CONNECTICUT DATE: 12 DEC '79

FIGURE 1



LOCATION PLAN

KINNEYTOWN DAM
SEYMOUR, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC. ANSONIA QUADRANGLE 1972

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

PROJECT INFORMATION
SECTION 1

1.1 General

a. Authority

Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Roald Haestad, Inc., has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Roald Haestad, Inc. under a letter of November 1, 1979, from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-80-C-0015 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The Purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to indentify conditions requiring correction in a timely manner by non-federal interest.
2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location

The dam is located on the Naugatuck River in the Town of Seymour, Connecticut, approximately one-half mile north of the Seymour-Ansonia Town Line. The dam is shown on the Ansonia U.S.G.S. Quadrangle Map having coordinates of latitude N41° 22.1' and longitude W73° 05.1'.

b. Description of Dam and Appurtenances

The dam consists of a concrete ogee spillway section with a crest length of 413 feet. There are two angle points at approximately the third points, which give the plan of the spillway an "S" shape. The right portion of the dam is 238 feet long and was constructed of rubble concrete in 1910. Construction records indicate that an upstream cut-off wall constructed of concrete was carried to rock or impervious stratum, and a downstream concrete toe wall contains 6-inch square weep holes. This section of the dam has provisions for 2 feet of flashboards, consisting of steel rods four feet on center, extending from iron pipe sleeves cast into the spillway crest. The left 175 feet of the dam is two feet higher in crest elevation and is constructed of concrete. This section was built in 1956 to replace an earthen embankment that was destroyed by the August 19, 1955 flood. The upstream cut-off in this section of the dam consists of a 3-foot wide concrete wall, 115 feet long down to ledge and 65 feet of steel sheet piling down to ledge, or a maximum of 10.5 feet below the base of the dam. A similar downstream toe wall is indicated on the As-Built plans. Both the left

and the right portions of the spillway have a height of approximately 20 feet. The right, or lower portion has a freeboard of 12.5 feet from spillway crest to the top of the abutments. The left, or higher portion has a freeboard of 10.5 feet from spillway crest to the top of the abutments.

A railroad embankment forms the left abutment of the dam, and a 50 foot long earth embankment connects the right training wall to the right abutment.

A 48-inch diameter manually operated blowoff is located at the left end of the dam.

An intake structure and canal to the left of the dam diverts water from the impoundment to a downstream pond.

c. Size Classification - Intermediate

According to the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, a dam is classified as "Intermediate" in size if the height is between 40 feet and 100 feet, or the dam impounds between 1,000 Acre-Feet and 50,000 Acre-Feet. The dam has a maximum height of 32.5 feet and a maximum storage capacity of 1,900 Acre-Feet. Therefore, the dam is classified as "Intermediate" in size based on its maximum storage capacity of 1,900 Acre-Feet.

d. Hazard Classification - Low to Significant

Based on the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the hazard classification for the dam is "Low" to "Significant". Extensive flood control structures have been built downstream of the dam to the confluence with the Housatonic River and it is doubtful that a failure of the dam would result in loss of life.

e. Ownership

Former Owner: The Ansonia Land and Water Power Company

Present Owner: The Anaconda American Brass Company
414 Meadow Street
Waterbury, Connecticut 06702
(203) 574-8500

f. Operator

John Proulx, Plant Engineer
The Anaconda American Brass Company
Ansonia Plant
Liberty Street
Ansonia, Connecticut 06401
(203) 574-8500

g. Purpose of the Dam

The dam is used to store and divert water from the Naugatuck River to a downstream pond where water is used by a manufacturing plant for generating electricity and for processing purposes.

h. Design and Construction History

The Kinneytown Dam was constructed by C. W. Blakeslee and Sons in 1910 for the Ansonia Land and Water Power Company, as engineered by John H. Cook, Hydraulic Engineer. The dam consisted of a 245 foot long rubble concrete ogee section constructed between existing stone masonry abutments. The dam replaced a log crib dam which was constructed 65 years earlier, and washed out during a flood on January 22, 1910. A 180 foot long earth embankment which was to the left of the rubble concrete dam washed out during the August 1955 flood. In 1956, the washed out earth embankment portion of the dam was replaced with a new concrete ogee section, as engineered by the American Brass Company and constructed by Mariani Construction Company.

The right portion of the dam was gunited in 1923, and again some time after 1949. A concrete apron was added downstream of the dam at an unknown date.

i. Normal Operational Procedure

Normal operational procedures include the opening and closing of gates in the diversion intake structure to maintain the water level in a downstream pond which supplies water for power generation and for processing purposes to a manufacturing plant.

1.3 Pertinent Data

a. Drainage Area

The drainage area consists of 300 square miles of rolling, wooded hills, with several rural and urban developments. 151.5 square miles of the watershed are controlled by upstream Corps of Engineers' flood control dams. The remaining 148.5 square miles were considered to contribute to the test flood.

b. Discharge at Damsite

The 413 foot long spillway consists of concrete ogee spillway sections. The 238 foot long section at the right end of the dam is two feet lower than the remaining 175 feet. Ordinarily the river flows over the lower spillway section, or is diverted through an intake structure into a canal on the left end of the dam. This canal flows to a downstream pond. A 48-inch low level outlet is also located at the left end of the dam. The maximum known discharge occurred on August 19, 1955 and was estimated at 125,000 cfs. The left portion of the dam was constructed after 1955.

1.	Outlet Works (conduit) Size:	48-inch
	Invert Elevation:	41.7
	Discharge Capacity:	260 cfs
2.	Maximum Known Flood at Damsite:	Approximately 125,000 cfs August 19, 1955

3.	Ungated Spillway Capacity at Top of Dam: Elevation:	59,000 cfs 64.55
4.	Ungated Spillway Capacity at Test Flood Elevation: Elevation:	61,200 cfs 64.8
5.	Gated Spillway Capacity at Normal Pool Elevation: Elevation:	N/A N/A
6.	Gated Spillway Capacity at Test Flood Elevation: Elevation:	N/A N/A
7.	Total Spillway Capacity at Test Flood Elevation: Elevation:	61,200 64.8
8.	Total Project Discharge at Top of Dam: Elevation:	59,000 cfs 64.55
9.	Total Project Discharge at Test Flood Elevation: Elevation:	63,000 cfs 64.8

c. Elevation - Feet Above Mean Sea Level (NGVD)

1.	Streambed at Toe of Dam:	32.5
2.	Bottom of Cutoff:	Varies from 23.5 to 34
3.	Maximum Tailwater:	50±
4.	Recreation Pool:	N/A
5.	Full Flood Control Pool:	N/A
6.	Spillway Crest:	52.05
7.	Design Surcharge - Original Design:	Unknown
8.	Top of Dam:	64.55
9.	Test Flood Surcharge:	64.8

d. Reservoir - Length in Feet

1. Normal Pool:	9,500'
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	9,500'
4. Top of Dam:	9,500'
5. Test Flood Pool:	9,500'

e. Storage - Acre-Feet

1. Normal Pool:	1,000 Acre-Feet
2. Flood Control Pool:	N/A
3. Spillway Crest Pool:	1,000 Acre-Feet
4. Top of Dam:	1,900 Acre-Feet
5. Test Flood Pool:	1,900 Acre-Feet

f. Reservoir Surface - Acres

1. Normal Pool:	68 Acres
2. Flood Control Pool:	N/A
3. Spillway Crest:	68 Acres
4. Test Flood Pool:	68 Acres
5. Top of Dam:	68 Acres

g. Dam

1. Type:	Concrete Gravity Ogee Spillway
2. Length:	413' at Spillway Crest
3. Height:	32.5'
4. Top Width:	N/A
5. Side Slopes:	U.S. - 1 Hor. to 12 Vert. D.S. - 8 Hor. to 12 Vert. (rt) 6.5 Hor. to 12 Vert. (lt)

6.	Zoning:	N/A
7.	Impervious Core:	N/A
8.	Cutoff:	Sheet steel piling and concrete cutoff to rock or impervious stratum upstream and downstream
9.	Grout Curtain:	N/A
10.	Other:	50 foot long earthen embankment located at right training wall and right abutment

h. Diversion and Regulating Tunnel

1.	Type:	N/A
2.	Length:	N/A
3.	Closure:	N/A
4.	Access:	N/A
5.	Regulating Facilities:	N/A

i. Spillway

1.	Type:	Concrete Ogee
2.	Length of Weir:	413'
3.	Crest Elevation with Flashboards: without Flashboards:	 413' @ 54.05* 175' @ 54.05 & 238' @ 52.05
4.	Gates:	N/A
5.	Upstream Channel	N/A
6.	Downstream Channel:	N/A
7.	General:	

j. Regulating Outlets

1.	Invert:	41.7
2.	Size:	48-inch

*Flashboards are not being used at the present time.

3.	Description:	Cast iron pipe through left end of spillway section. Discharge Capacity of 260 cfs.
4.	Control Mechanism:	Manual Operated Sluice Gate
5.	Other:	A diversion intake structure and canal at the left end of the dam diverts water from the impoundment to a downstream pond. The intake structure contains 5 manually operated gates approximately 48" x 48" in size. Invert 45± Normal Discharge 37 cfs

ENGINEERING DATA
SECTION 2

2.1 Design Data

Design information which was available and reviewed included plans for the original construction prepared by John H. Cook, Hydraulic Engineer, in 1910, and As-Built Plans showing the reconstruction of the left portion of the dam following the August 19, 1955 Flood prepared by the Engineering Department of the American Brass Company. Also reviewed were plans which showed the limits of washout below the apron prepared by the American Brass Company in 1924 and 1929. No design calculations were available.

2.2 Construction Data

Construction data consisted of the As-Built Plans for the reconstruction of the left portion of the dam, and a job file which included several photographs and various correspondence concerning the dam.

The As-Built drawings indicate that the right 120 foot section of the new dam was built first, while the river was diverted between the old and the new dam. The middle 40 feet of this section was only poured to elevation 41.0, and the river was diverted through this section while the left 58 feet of the dam was built. The river was diverted through the canal and blowoff pipe while the remaining portion of the 40 foot section was completed.

No other information concerning the construction was available.

2.3 Operation Data

No formal records pertaining to the water level in the impoundment are kept.

2.4 Evaluation of Data

a. Availability

Existing data was provided by the State of Connecticut, Department of Environmental Protection, and the Anaconda American Brass Company. A list of available reference material is given in Appendix B.

b. Adequacy

The information which was available along with the visual inspection, past performance history, and hydraulic and hydrologic calculations were adequate to assess the condition of the facility.

c. Validity

Field inspections and surveys revealed that the dam was constructed substantially as shown on the plans. Concrete was added downstream of the apron in what appears to be an attempt to eliminate the undercutting and erosion of the apron.

VISUAL INSPECTION
SECTION 3

3.1 Findings

a. General

The visual inspection of the dam was conducted on December 11, 1979. The inspection team was accompanied by Mr. John Proulx of the Anaconda American Brass Company. Approximately three inches of water was spilling over the right portion of the spillway. The general condition of the dam at the time of the inspection was fair.

b. Dam

Over most of its length, the right (lower) spillway section has a four foot vertical drop at the end of the spillway apron, as shown in Photo 1. A vertical concrete wall was generally present at this drop. However, at the right end of the spillway this wall was missing and the concrete apron had been undermined up to 12 feet back under the apron, as shown in Photos 1 and 2. No water was observed seeping from the soil exposed by this undermining. The underside of the apron, exposed by the undermining, appeared to be sound concrete. The undermined and eroded area has begun to spread around the downstream end of the right training wall and a surficial sloughing failure has occurred on the right bank of the river just downstream of the right training wall, as shown in Photo 3. The upstream end of the apron of the right spillway section showed cracking and some evidence of erosion, as shown in Photo 4. The spillway apron as observed in the field extends further downstream than shown on the construction plans. The right spillway showed evidence of

spalling in the form of irregularities in the flow of water over the spillway, Photo 1. The right spillway section has provisions for flashboards and some debris was collected at portions of the spillway crest.

The right training wall showed spalling and evidence of seepage in the form of efflorescence, Photo 5.

The concrete of the left (higher) spillway section contained areas of minor spalling and efflorescence, as illustrated in Photo 6. Portions of the concrete apron downstream of the spillway section appeared to be missing, as shown in Photo 7. This apron was not shown on the construction drawings for this section of the dam.

The left training wall appeared to be in good condition. Seepage was observed exiting from a sheet pile wall located downstream of the left training wall, as shown in Photos 8 and 9, and exiting from the base of the railway embankment downstream of the sheet pile wall. The sheet pile wall shows signs of deterioration and lateral movement into the channel.

The earth embankment on the right end of the dam was covered with relatively thick tree and brush growth. No seepage was observed on the downstream face of the embankment.

c. Appurtenant Structures

The appurtenant structures consist of a blowoff, a diversion intake channel, a diversion intake structure and gatehouse, a diversion canal, and a railroad bridge.

The blowoff pipe is a 48-inch diameter cast iron pipe passing through the left end of the dam. The blowoff is controlled by a gate at the upstream end of the conduit. The conduit, operator, and operator platform appeared to be in good condition. The gate was not observed.

The diversion intake is located on the left side of the railroad embankment that forms the left abutment of the dam. The right wall of the intake channel is a mortared masonry wall and the left wall of the intake channel is a concrete wall, as shown in Photo 10. Some of the joints in the mortared wall were observed to be open. The concrete wall appeared to be in good condition above the water level.

The intake structure and gatehouse is a concrete and brick structure which contains 5 gates that control the flow of water to the downstream canal. The structures appeared to be in good condition above the water line.

The diversion canal is located downstream from the intake structures and gatehouse and is separated from the river downstream of the dam by the railroad embankment.

The railroad bridge carries the railroad across the diversion intake channel and was not inspected.

d. Reservoir Area

There were no indications of instability along the edges of the reservoir in the vicinity of the dam.

e. Downstream Channel

The downstream channel for the spillway is the natural streambed of the Naugatuck River. In approximately the left two-thirds of the streambed, rock outcrops are exposed at or slightly downstream of the spillway apron. The right one-third of the streambed was covered with large stones and boulders, but no bedrock outcrops were observed near the end of the spillway apron.

3.2 Evaluation

On the basis of the visual inspection and a review of design and construction data, the dam is judged to be in fair condition. Although no evidence of present instability was observed, several observed conditions, if allowed to continue, could produce unstable conditions in the future.

The erosion and undermining of the spillway apron at the right side of the dam, if it continues, could jeopardize the safety of the dam. The lack of seepage in the area where the spillway apron has been undermined suggests that the upstream cutoff wall is relatively impervious.

The spalling and cracking of the spillways, the spillway aprons, and the right training wall could eventually lead to enough degradation of the concrete to jeopardize the structural stability of the dam.

Piping may develop because of the seepage downstream of the left training wall and through the right training wall. Further deterioration and movement of the sheet pile wall downstream of the left training wall could lead to failure of the railroad embankment which separates the canal from the river.

The roots of trees growing on the earth embankment on the right end of the dam could provide pathways for internal erosion.

OPERATIONAL AND MAINTENANCE PROCEDURES

SECTION 4

4.1 Operational Procedures

a. General

Normal operational procedures include the opening and closing of gates in the diversion intake structure to maintain the water level in the downstream pond, which supplies water for power generation and for processing purposes to a manufacturing plant. The blowoff is generally operated once or twice a year during high flows or to lower the water level for an annual inspection of the dam.

b. Description of Any Warning System in Effect

There is no formal warning system in effect. The dam is monitored during heavy flows.

4.2 Maintenance Procedures

a. General

Maintenance procedures consist of an annual inspection of the dam by the owner and the making of any necessary repairs. No records of the annual inspections are maintained. Flashboards are normally in use on the lower portion of the spillway. The flashboards are usually destroyed by ice during the winter and replaced each spring. The owner's representative indicated that the existing provisions for flashboards, consisting of steel rods in iron sleeves, would be replaced next year.

b. Operating Facilities

The diversion intake structure is inspected each year and repairs are made as required. Last year extensive work was done on the gates.

4.3 Evaluation

The present operational and maintenance procedures are inadequate. An operational and maintenance manual for the dam and operating facilities should be prepared. The annual inspections of the dam and operating facilities by the owner should continue and records kept of the finding and recommendations. Additionally, the dam should be inspected every year by qualified registered engineers and any problems, such as the undermining of the right spillway apron and training wall, investigated and corrected.

A formal warning system should be put into effect and should include monitoring of the dam during extemely heavy rains. This warning system should include procedures for notifying proper authorities in the event of an emergency.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES
SECTION 5

5.1 General

The Kinneytown Dam has an overflow spillway consisting of concrete ogee sections, with a total crest length of 413 feet. The right 238 feet of the dam is two feet lower than the remaining 175 feet and has provisions for flashboards though none were in place at the time of inspection. Storage capacity at the top of the dam is estimated at 1,900 Acre-Feet.

The tributary watershed at the dam site is 300 square miles, half of which is controlled by upstream Corps of Engineers' flood control dams. The watershed consists of rolling hills.

The dam is a run-of-the-river diversion structure, and has a gated outlet to a diversion canal on the left side of the dam. The gatehouse reportedly contains five 48" x 48" gates which discharge to another pond via the canal. Water is drawn from the pond for industrial process water and power generation at a maximum rate of 37 cfs. Plans of the gates were not available and the gates could not be observed, as they were under water. There is a 48-inch blowoff located at the left end of the dam. The capacity of the blowoff is about 260 cfs.

The river channel from about 3,500 feet downstream of the dam to the confluence of the Housatonic River is protected by the Corps' Ansonia and Derby Local Protection Projects. These projects provide protection for a design discharge of 75,000 cfs with an additional freeboard of three feet. There is no development in the potential flood area between the dam and the local protection projects.

5.2 Design Data

Plans are available and included in Appendix B. Hydraulic/ hydrologic design data were not available.

5.3 Experience Data

The left 175 feet of the spillway was constructed after the 1955 flood to replace an earthen embankment which was washed out. The peak discharge of the August 19, 1955 flood has been estimated at 125,000 cfs at the damsite. Several flood control dams have been built on the watershed since 1955.

5.4 Test Flood Analysis

The hydraulic height of the dam, 32.5 feet, and the storage capacity, 1,900 Acre-Feet, classify the dam as "Intermediate" in size. Hazard potential, because of the flood control structures downstream, was determined to be between "Low" and "Significant".

A test flood equal to the 1/2 PMF was selected. Of the 300 square mile watershed, 151.5 square miles are controlled by flood control dams and are not considered to contribute to the test flood. Using the guide curves supplied by the Corps of Engineers for "rolling" terrain, a peak inflow of 850 cubic feet per square mile (csm), equal to 63,000 cfs, was calculated for the remaining 148.5 square mile watershed. The reservoir surface of 68 acres is too small to affect the flood peak, so discharge was considered equal to the inflow. The initial water level was assumed at spillway elevation.

The spillway capacity of 59,000 cfs is equal to 94% of the test flood assuming the diversion gates and blowoff are closed.

5.5 Dam Failure Analysis

A dam failure analysis was made with the "Rule of Thumb" guidance provided by the Corps of Engineers. Failure was assumed to occur when the water level reached the top of the dam abutments. The "Rule of Thumb" formula assumes a breach length of 40% of the dam length at mid-height. Spillway flow over the remaining 60% of the spillway was added to the flow from the breach. The peak discharge was calculated to be 87,000 cfs.

A flood routing was made of the resulting flood peak. The calculations show the dam breach peak to have dissipated before reaching the flood control works and would not exceed the 75,000 cfs capacity of the flood control works.

There is one area in Ansonia, located on the right bank between the Maple Street and Bridge Street bridges, which is not fully protected by the flood control works. However, in this area, the dam breach peak flood should be essentially equal to the spillway discharge before the breach (59,000 cfs).

The railroad tracks paralleling the river below the dam would be submerged before the assumed dam breach occurs.

The Kinneytown Dam has been classified as "Low" to "Significant" hazard potential because of extensive flood control structures built downstream of the dam.

EVALUATION OF STRUCTURAL STABILITY
SECTION 6

6.1 Visual Observations

The visual inspection did not disclose any evidence of present structural instability.

6.2 Design and Construction Data

The design and construction data that was available included construction plans, As-Built Plans, a few photographs, and a file which included miscellaneous correspondence concerning the dam. No sub-surface data was available. Adequate information is not available to permit an in-depth stability analysis of the dam.

6.3 Post-Construction Changes

Since the completion of the dam in 1956, the effective drainage area tributary to the Naugatuck River above the damsite has been reduced from 300 square miles to 148.5 square miles due to the construction of the Thomaston, Northfield Brook, Black Rock, Hancock Brook, and Hop Brook flood control dams.

The river channel downstream of the dam to the confluence with the Housatonic River has also been protected by the Corps of Engineers' Ansonia/Derby Local Protection Projects since the completion of the dam.

Portions of the spillway aprons extend further downstream than are shown on the plans, which indicate that additional concrete was added, possibly to remedy erosion problems which occurred in the past. Various correspondence and drawings indicated that as early as 1924, problems concerning undercutting and erosion of the spillway apron existed.

6.4 Seismic Stability

The dam is located in Seismic Zone 1, and in accordance with the recommended Phase I inspection guidelines, does not warrant Seismic Stability Analysis.

ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

SECTION 7

7.1 Dam Assessment

a. Condition

On the basis of the visual inspection and a review of available data, the dam is judged to be in fair condition. The future safety of the dam could be affected by: (1) continuing erosion and undermining of the spillway apron; (2) further deterioration in the concrete of the spillway, spillway aprons, and training walls; (3) piping that might develop because of seepage downstream of the left training wall and through the right training wall; (4) seepage and piping that might develop because of tree growth in the earth embankment section at the right end of the dam; and (5) continued deterioration and lateral movement of the left sheet pile wall.

b. Adequacy of Information

The information available was sufficient for performing a Phase I inspection.

c. Urgency

The recommendations presented in Section 7.2 and 7.3 should be carried out within one year of receipt of this report by the owner.

7.2 Recommendations

The following recommendations should be carried out under the direction of a qualified registered engineer.

a) The erosion and undermining at the right end of the spillway apron and the apparent loss of other sections of the spillway apron should be investigated and erosion protection systems should be designed and constructed.

b) The spalling and cracking of the concrete structures should be examined and necessary repairs should be made.

c) The causes of the seepage downstream of the left training wall and through the right training wall should be investigated and a seepage control system should be designed and constructed, if necessary.

d) The tree growth on the earth embankment should be removed by uprooting and the root zones backfilled with carefully selected soil, placed as directed by the engineer.

e) The condition of the sheet piling downstream of the left training wall should be investigated and repairs made as required.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

1. A program of annual technical inspections by qualified registered engineers should be instituted. Any erosion or seepage should be carefully described during these inspections.

2. A formal operations and maintenance manual should be prepared. The present annual inspections of the dam and operating facilities by the owner should continue and records of the findings kept.

3. A formal warning system should be put into effect and should include monitoring of the dam during extremely heavy rains. This warning system should also include procedures for notifying proper authorities in the event of an emergency.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A

VISUAL CHECK LIST WITH COMMENTS

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

[illegible] Kennebunk Dam

9:00 a.m.

[illegible] TIME: to 12:00 noon WEATHER: Rain - 35°

[illegible] U.S. N/A DN.S

	NAME	DISCIPLINE
1.	[illegible] Harold Haerstad, Inc.	Civil/Hydrologist
2.	[illegible] Harold Haerstad, Inc.	Civil Engineer
3.	[illegible] Geotechnical Engineers, Inc.	Geotechnical Engineer
4.	[illegible] Engineers, Inc.	Geotechnical Engineer
5.	[illegible] American Brass Co.	Owner's Representative
6.		

	INSPECTED	REMARKS
1. [illegible]	[illegible]	Fair - some spalling. Undermining of right end apron
2. [illegible]	[illegible]	Trees and brush on embankment
3. [illegible]	[illegible]	Spalling-seepage behind left sheet piles
4. [illegible]	[illegible]	Good
5. [illegible]	[illegible]	Good - some joints open in right wall
6. [illegible]	[illegible]	Good
7. [illegible]	[illegible]	Good
8.		
9.		
10.		
11.		
12.		

PERIODIC INSPECTION CHECK LIST

PROJECT: Kinneytown Dam DATE: 12/13/79

PROJECT FEATURE: Spillway Sections NAME: RGL, DLS

DISCIPLINE: Geotechnical - Civil NAME: GC, JF

AREA ELEVATION	CONDITIONS
SPILLWAY SECTIONS OF DAM CREST ELEVATION	238' at Elevation 52.05 175' at Elevation 54.05
CURRENT POOL ELEVATION	52.3 (estimated)
MAXIMUM IMPOUNDMENT TO DATE	Overtopped and washed out in 1955
SURFACE CRACKS	N/A
PAVEMENT CONDITION	N/A
MOVEMENT OR SETTLEMENT OF CREST	None observed
LATERAL MOVEMENT	None observed
VERTICAL ALIGNMENT	Good
HORIZONTAL ALIGNMENT	Good
CONDITION AT ABUTMENT AND AT CONCRETE STRUCTURES	Spalling observed on concrete spillways, aprons, and right abutment wall. Cracks in spillway aprons
INDICATIONS OF MOVEMENT OF STRUCTURAL ITEMS ON SLOPES	N/A
TRESPASSING ON SLOPES	N/A
VEGETATION ON SLOPES	N/A
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	Sloughing failure in right river bank downstream of right training wall.
ROCK SLOPE PROTECTION-RIPRAP FAILURE	N/A
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOE	Erosion and undermining of concrete spillway apron at right end of spillway. Apparent losses of section of concrete at downstream ends of spillway apron
UNUSUAL EMBANKMENT OR DOWNSTREAM SEEPAGE	Seepage exiting from sheet pile wall downstream of left training wall. Efflorescence on downstream end of right training wall
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	None known or observed
TOE DRAINS	None known or observed
INSTRUMENTATION SYSTEM	None known

PERIODIC INSPECTION CHECK LIST

PROJECT: Kinneytown Dam DATE: 12/13/79

PROJECT FEATURE: Dam Embankment NAME: JF

DISCIPLINE: Geotechnical Engineer NAME: GC

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
CREST ELEVATION	Top of Dam - Elevation 64.55
CURRENT POOL ELEVATION	52.3
MAXIMUM IMPOUNDMENT TO DATE	Dam overtopped in 1955
SURFACE CRACKS	None observed
PAVEMENT CONDITION	N/A
MOVEMENT OR SETTLEMENT OF CREST	None observed
LATERAL MOVEMENT	None observed
VERTICAL ALIGNMENT	Good
HORIZONTAL ALIGNMENT	Good
CONDITIONS AT ABUTMENT AND AT CONCRETE STRUCTURES	Toe of embankment at the right abutment has eroded, undermining training wall
INDICATIONS OF MOVEMENT OF STRUCTURAL ITEMS ON SLOPES	Relatively thick tree and brush growth
TRESPASSING ON SLOPES	None observed
VEGETATION ON SLOPES	Trees and brush
SLOUGHING OR EROSION OF SLOPES OR ABUTMENTS	Sloughing failure in right river bank downstream of right training wall.
ROCK SLOPE PROTECTION - RIPRAP FAILURE	None
UNUSUAL MOVEMENT OR CRACKING AT OR NEAR TOES	None observed
UNUSUAL EMBANKMENT OR DOWNSTREAM SEEPAGE	None observed
PIPING OR BOILS	None observed
FOUNDATION DRAINAGE FEATURES	None known or observed
TOE DRAINS	None known or observed
INSTRUMENTATION SYSTEM	None known

PERIODIC INSPECTION CHECK LIST

PROJECT: Kinneytown Dam DATE: 12/13/79

PROJECT FEATURE: Outlet Works - Spillway Weirs Approach & Discharge Channels NAME: GC,JF

DISCIPLINE: Civil - Geotechnical NAME: RGL,DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
A. APPROACH CHANNEL:	N/A
GENERAL CONDITION	N/A
LOOSE ROCK OVERHANGING CHANNEL	N/A
TREES OVERHANGING CHANNEL	N/A
FLOOR OF APPROACH CHANNEL	N/A
B. WEIR AND TRAINING WALLS:	
GENERAL CONDITION OF CONCRETE	Fair
RUST OR STAINING	Some at construction joints
SPALLING	Some spalling of weir and apron
ANY VISIBLE REINFORCING	No
ANY SEEPAGE OR EFFLORESCENCE	Seepage from behind steel sheet piling at left abutment: some areas of efflorescence on weir
DRAIN HOLES	None observed
C. DISCHARGE CHANNEL:	
GENERAL CONDITION	Good
LOOSE ROCK OVERHANGING CHANNEL	None
TREES OVERHANGING CHANNEL	None
FLOOR OF CHANNEL	Ledge and boulders, some debris

OTHER:

Large amount of debris collected on pins for weir boards - obstructing flow over spillway

PERIODIC INSPECTION CHECK LIST

PROJECT: Kinneytown Dam DATE: 12/13/79

PROJECT FEATURE: Outlet Works - Blowoff NAME: RGL

DISCIPLINE: Civil Engineer NAME: DLS

AREA EVALUATED	CONDITIONS
OUTLET WORKS - BLOWOFF	
GATE - OUTLETS THROUGH CONCRETE SPILLWAY AT LEFT ABUTMENT	Upstream portion could not be observed. Downstream observed through 48" conduit. Gate tight, very little leakage.
OPERATOR & PLATFORM	Good, not operated
CONDUIT THROUGH SPILLWAY	Good - some pitting of cast iron

PERIODIC INSPECTION CHECK LIST

PROJECT: Kinneytown Dam DATE: 12/13/79

PROJECT FEATURE: Diversion Intake Channel and Structure NAME: GC, JF

DISCIPLINE: Geotechnical & Civil NAME: RGL, DLS

AREA EVALUATED	CONDITIONS
DIVERSION INTAKE CHANNEL AND INTAKE STRUCTURE	
A. APPROACH CHANNEL:	
SLOPE CONDITIONS	No slopes*
BOTTOM CONDITIONS	Could not be observed - underwater
ROCK SLIDES OR FALLS	N/A
LOG BOOM	N/A
DEBRIS	None observed
CONDITION OF CONCRETE LINING	N/A
DRAINS OR WEEP HOLES	N/A
B. INTAKE STRUCTURE:	
CONDITION OF CONCRETE	Good
STOP LOGS AND SLOTS	Trash racks - good condition

*Left wall is concrete in good condition; right wall is mortared stone masonry with some open joints.

PERIODIC INSPECTION CHECK LIST

PROJECT: Kinneytown Dam DATE: 12/13/79

PROJECT FEATURE: Diversion - Gate House NAME: DLS

DISCIPLINE: Civil Engineer NAME: RGL

AREA EVALUATED	CONDITIONS
DIVERSION - GATE HOUSE	
A. CONCRETE AND STRUCTURAL:	
GENERAL CONDITION	Good
CONDITION OF JOINTS	None observed, as chamber is normally filled with water
SPALLING	None observed
VISIBLE REINFORCING	No
RUSTING OR STAINING OF CONCRETE	None observed
ANY SEEPAGE OR EFFLORESCENCE	None observed
JOINT ALIGNMENT	No joints observed
UNUSUAL SEEPAGE OR LEAKS IN GATE CHAMBER	None observed as chamber is normally filled with water
CRACKS	None observed
RUSTING OR CORROSION OF STEEL	Steel beams supporting floor boards rusted
B. MECHANICAL AND ELECTRICAL:	
AIR VENTS	Opening in brickwall with steel bars
FLOAT WELLS	N/A
CRANE HOIST	N/A
ELEVATOR	N/A
HYDRAULIC SYSTEM	N/A
SERVICE GATES	Operators and exposed portion of gates appear good
EMERGENCY GATES	N/A
LIGHTNING PROTECTION SYSTEM	N/A
EMERGENCY POWER SYSTEM	N/A
WIRING AND LIGHTING SYSTEM IN GATE CHAMBER	Good

PERIODIC INSPECTION CHECK LIST

PROJECT: Kinneytown Dam DATE: 12/13/79

PROJECT FEATURE: Diversion - Outlet Structure and Channel NAME: RGL, DLS

DISCIPLINE: Geotechnical & Civil NAME: GC, JF

AREA EVALUATED	CONDITIONS
DIVERSION - OUTLET STRUCTURE AND OUTLET CHANNEL	(DIVERSION CANAL)
GENERAL CONDITION OF CONCRETE	N/A
RUST OR STAINING	N/A
SPALLING	N/A
EROSION OR CAVITATION	N/A
VISIBLE REINFORCING	N/A
ANY SEEPAGE OR EFFLORESCENCE	N/A
CONDITION AT JOINTS	N/A
DRAIN HOLES	N/A
CHANNEL	Diversion canal separated from river by railway embankment
LOOSE ROCK OR TREES OVERHANGING CHANNEL	None observed
CONDITION OF DISCHARGE CHANNEL	Good

APPENDIX B

ENGINEERING DATA

LIST OF REFERENCES

References 1 through 3 are located at the Anaconda American Brass Company, Waterbury Office, 414 Meadow Street, Waterbury, Connecticut.

References 4 through 8 are located at the Anaconda American Brass Company, Ansonia Plant, Liberty Street, Ansonia, Connecticut.

Reference 9 is located at the Department of Environmental Protection, Office of the Superintendent of Dams, State Office Building, Hartford, Connecticut.

1. Plan and Section, "Proposed Dam on the Naugatuck River", The Ansonia Land and Water Power Company, 1910.

2. Plans, sections, details, "Proposed Extension of Concrete Dam - Kinneytown Dam", Ansonia Division, Seymour, Connecticut. The American Brass Company, October 3, 1957.

3. Numerous miscellaneous plans and details of Kinneytown Dam.

4. Photographs of original wood crib dam after wash-out in 1910.

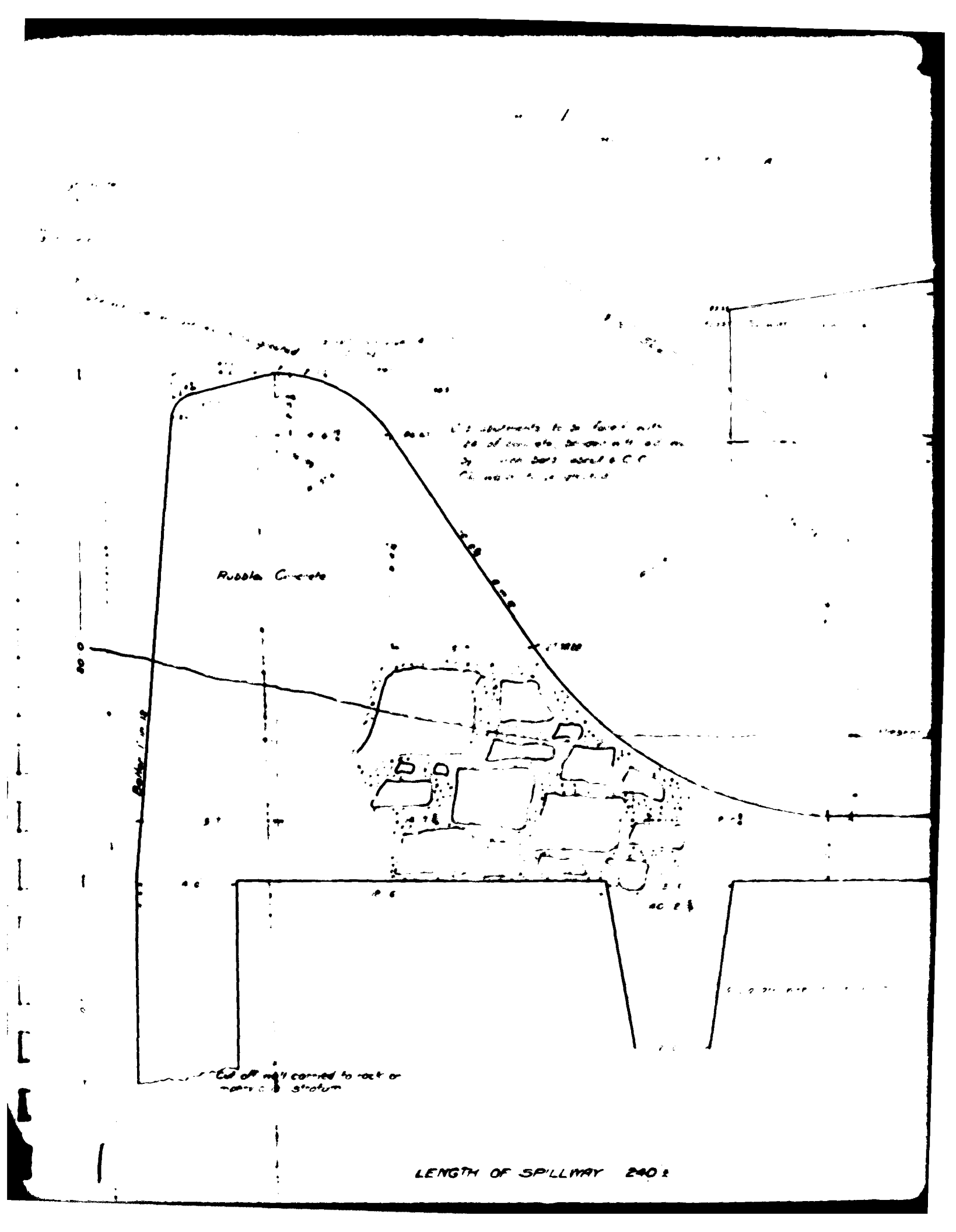
5. Description of Kinneytown Dam, The Sentinal, March 1, 1911, Ansonia Library.

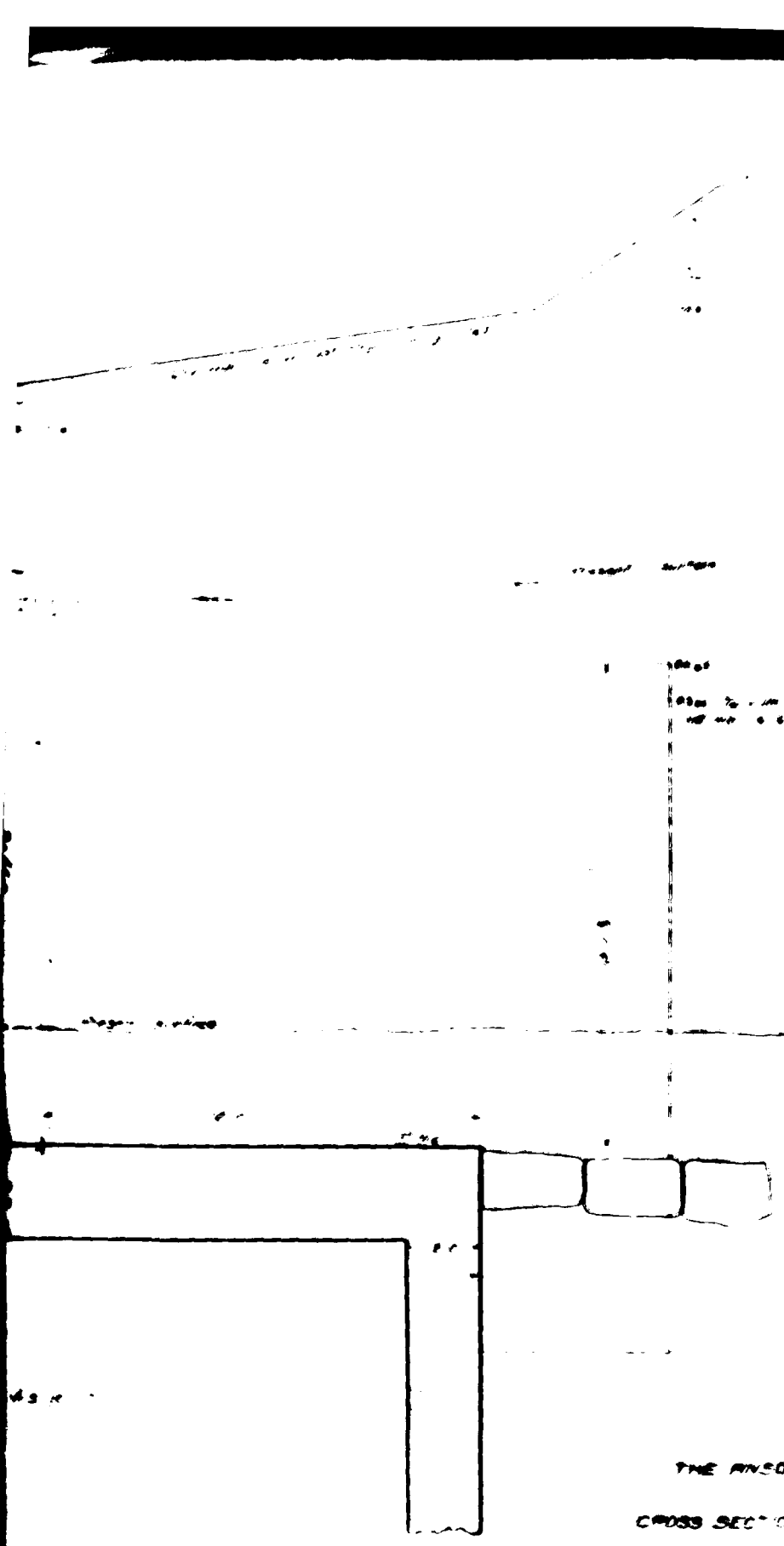
6. "Report on Conditions Existing at Kinneytown Dam During the Flood of April 7, 1924", W.A. Cowles, Vice-President, April 15, 1924

7. Photographs after washout of embankment, 1955.

8. Numerous other correspondence from 1910 to present concerning maintenance and operation of the dam.

9. "American Brass Company, Kinneytown Dam, Naugatuck River, Ansonia", Letter Report by A.M. McKenzie, Civil Engineer for the Water Resources Commission, State of Connecticut, April 20, 1966.


Rubble Concrete
LENGTH OF SPILLWAY 240'



Elevation of West Abutment

Scale 8' = 1'

Approved July 30 1910

Wm G Smith

Member of Board of Civil E

Waterbury Conn

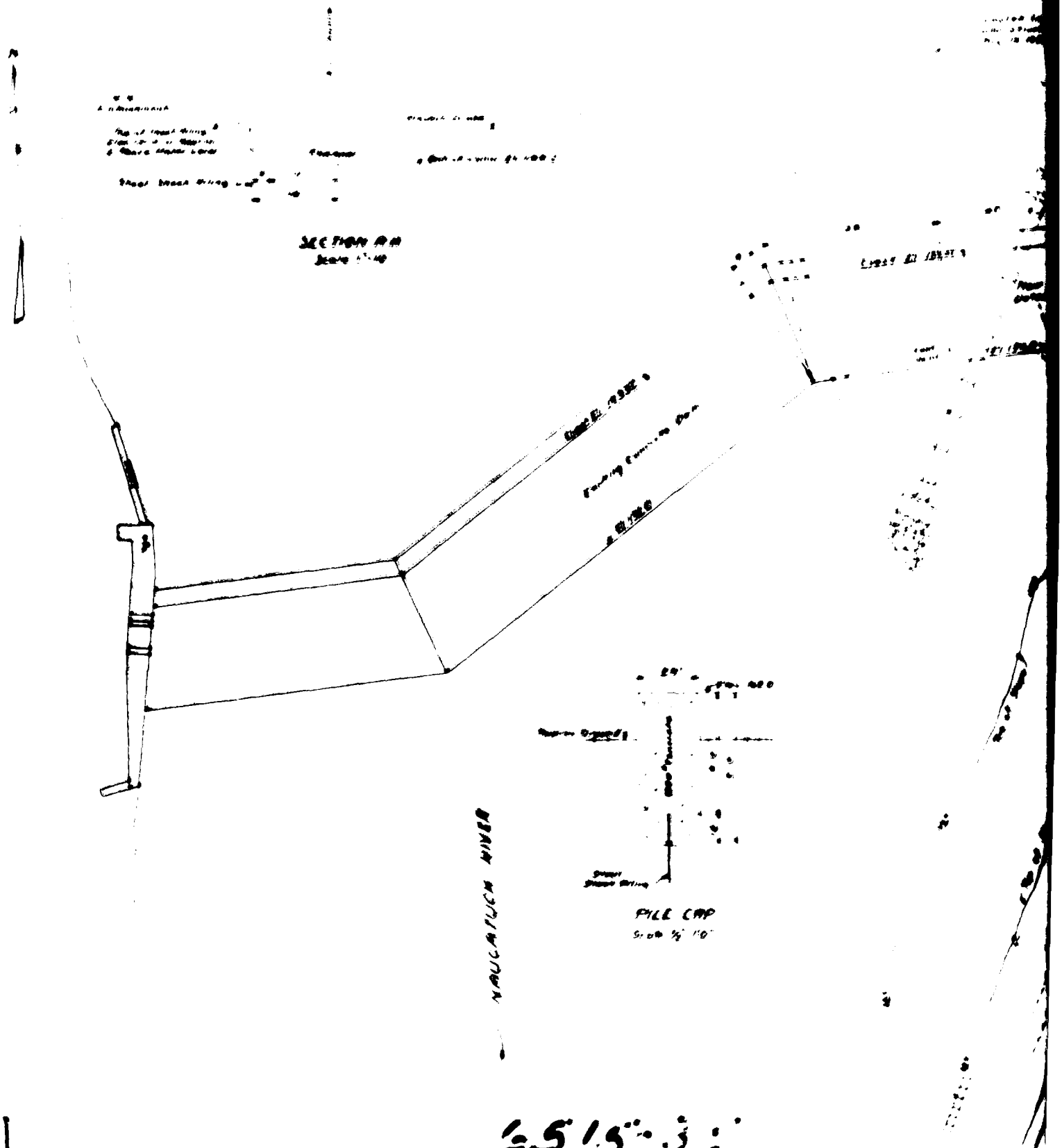
THE ANSONIA LAND and WATER POWER CO

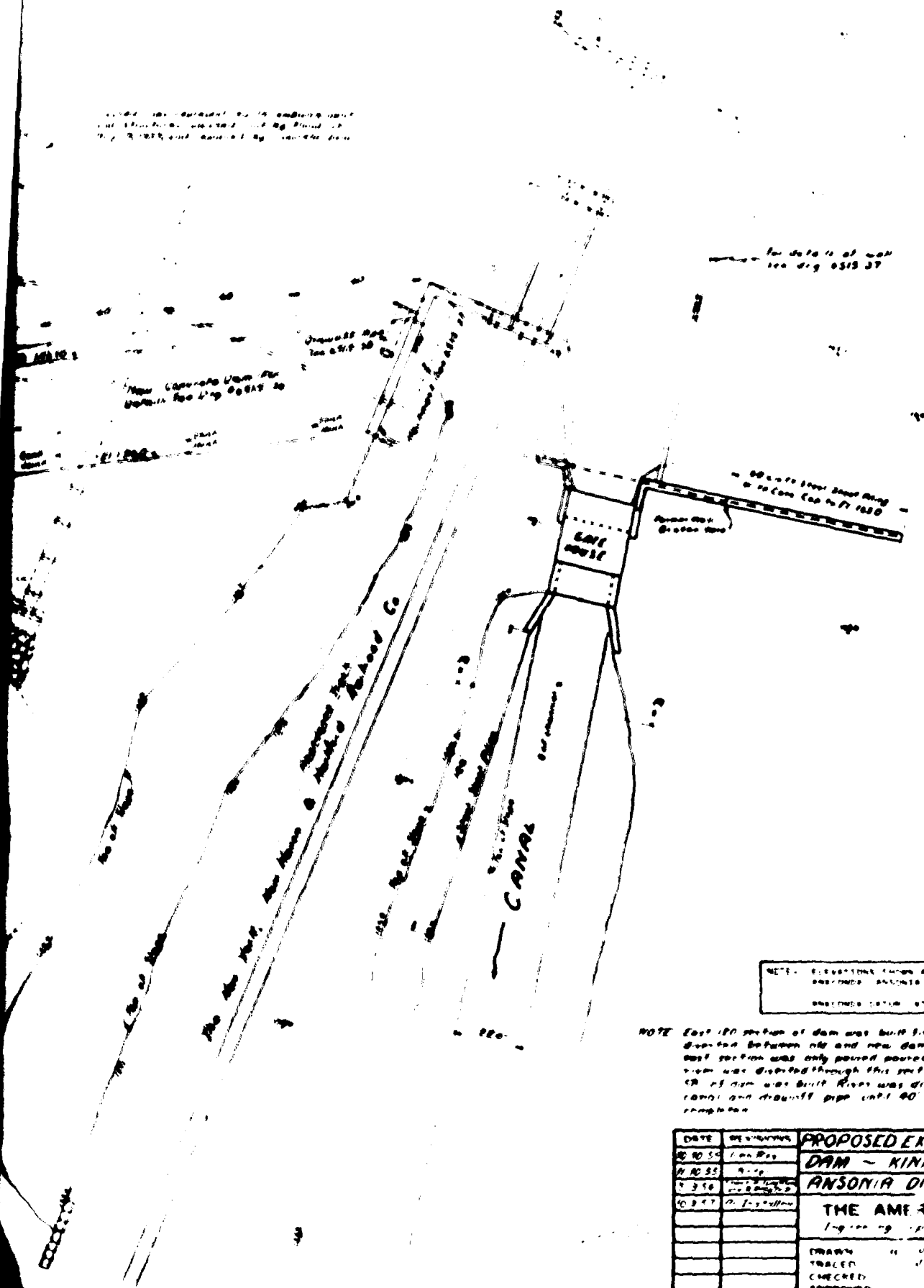
CROSS SECTION OF PROPOSED DAM ON THE

HOUSATONIC RIVER

SCALE [illegible]

JULY 1910


SECTION A-A
PILE CAP
NAUGATUCK RIVER



NOTE: East 180 section of dam was built first while river was diverted between old and new dam. Middle 90' of east section was only poured to El 138.50 and river was diverted through this section while west section of dam was built. River was diverted through canal and drawoff pipe until 90' section was completed.

DATE	DESCRIPTION
10 10 55	Issued
11 10 55	Revised
9 3 56	Revised
10 3 57	As Installed

PROPOSED EXTENSION OF CONCRETE DAM ~ KINNEYTOWN DAM

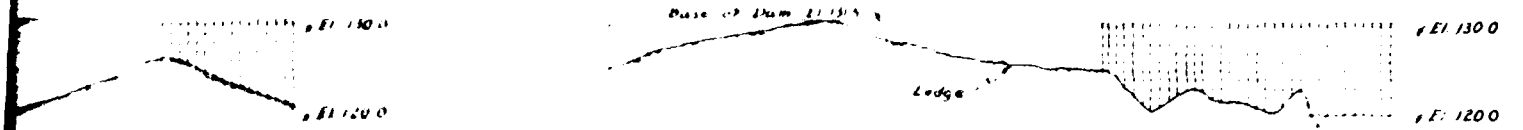
ANSONIA DIV ~ SEYMOUR CONN.

THE AMERICAN BRASS CO.

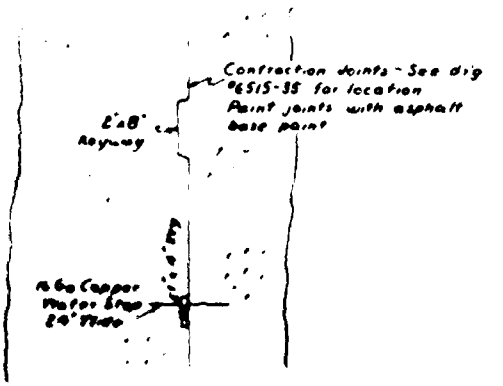
Waterbury Conn.

DRAWN J T M DATE Oct 4, 1955
TRACED J T M Oct 3, 1957
CHECKED
APPROVED
SCALE 1" = 20'

[illegible] SECTION OF [illegible]



PROFILE UPSTREAM CUT-OFF
Scale Vert 1"-10' - Horiz 1"-20'



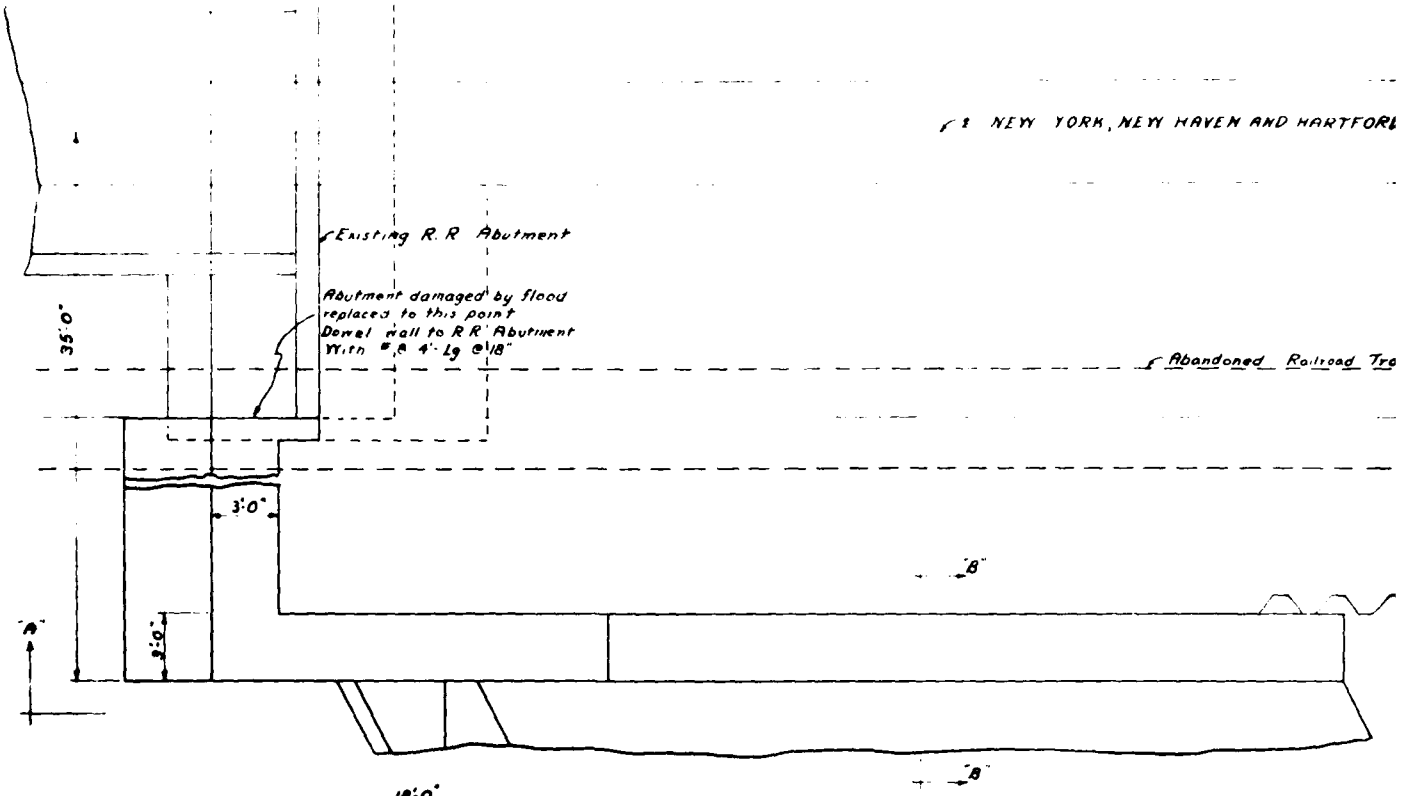
CONTRACTION JOINT &
WATER STOP DETAIL

NOTES
The end of existing spillway to hard concrete and paint with Dampcoat as recommended by Mfg
Concrete shall be proportioned to obtain a compressive strength of 3000 p.s.i. at 28 days and 2"-3" slump
Use 1½ coarse aggregate

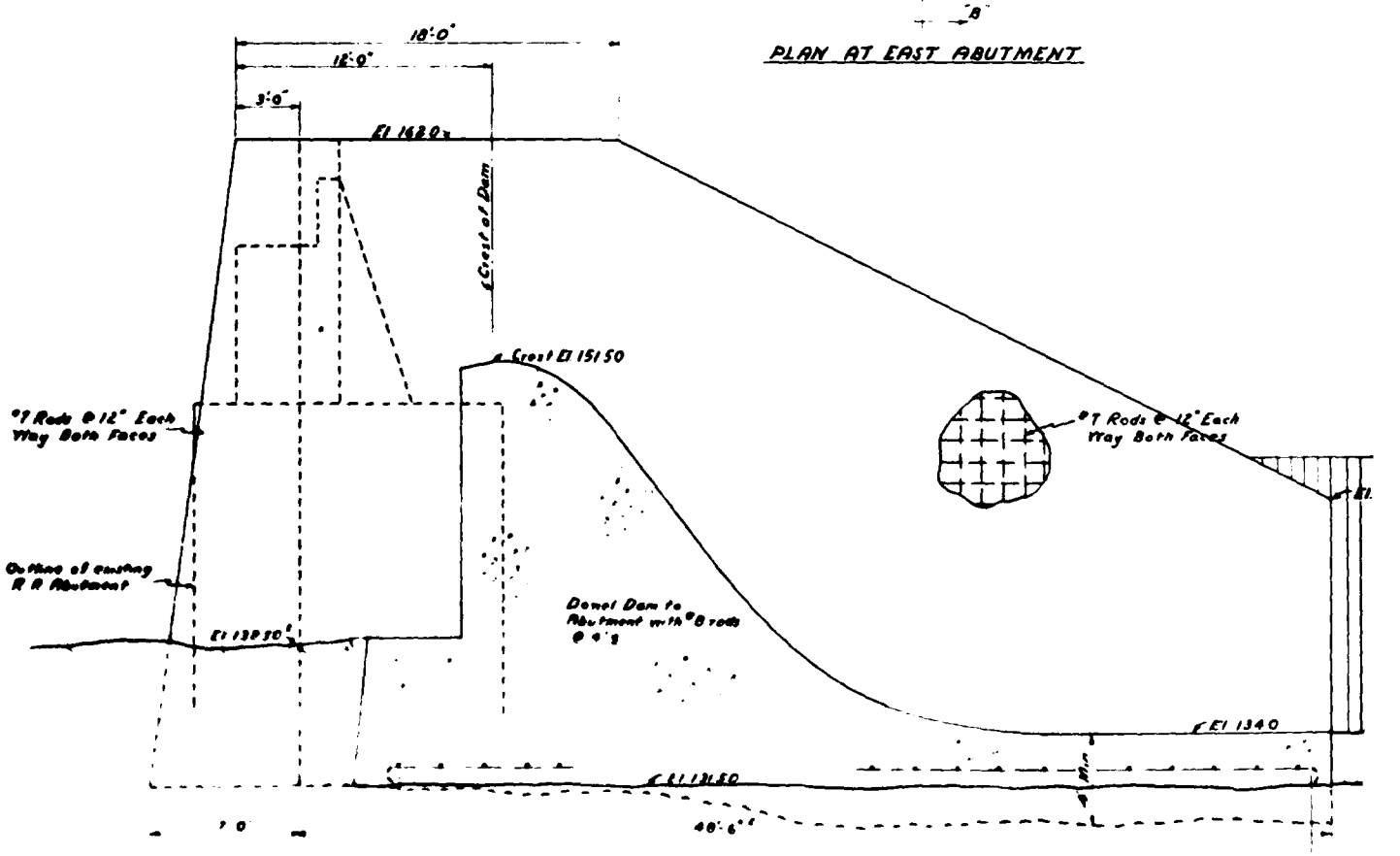
DATE	REVISIONS
10-25-57	Gen Rev
10-25-57	Spillway Slope
10-25-57	Concrete Spillway
11-2-57	Gen Rev
12-9-57	Gen Rev

CROSS SECTION OF DAM
KINNEYTOWN DAM
ANSONIA DIV - SEYMOUR CONN
THE AMERICAN BRASS CO.
Engineering Dept Waterbury Conn

DRAWN BY J.T.M. DATE Oct 8 1957
TRACED J.T.M. Oct 9, 1957
CHECKED
APPROVED
SCALE 1"=10'



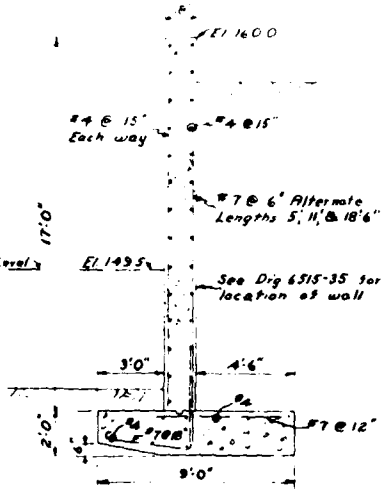
PLAN AT EAST ABUTMENT



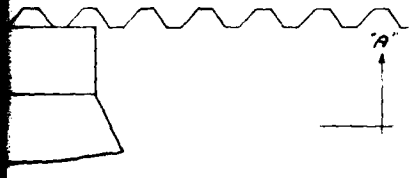
SECTION A A

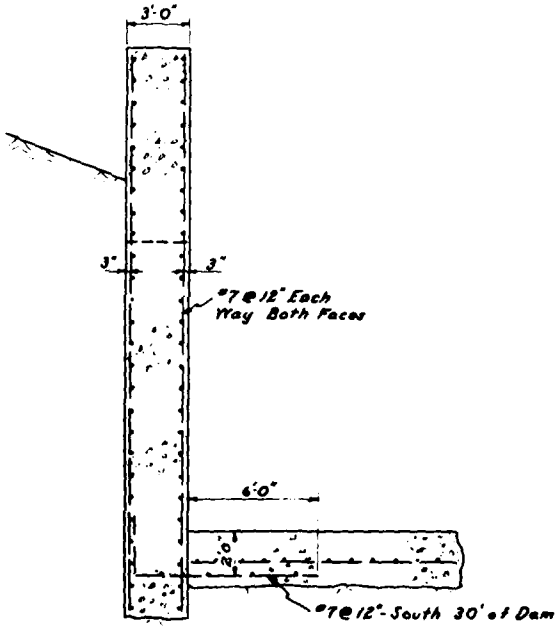
D HARTFORD RAILROAD

Railroad Track

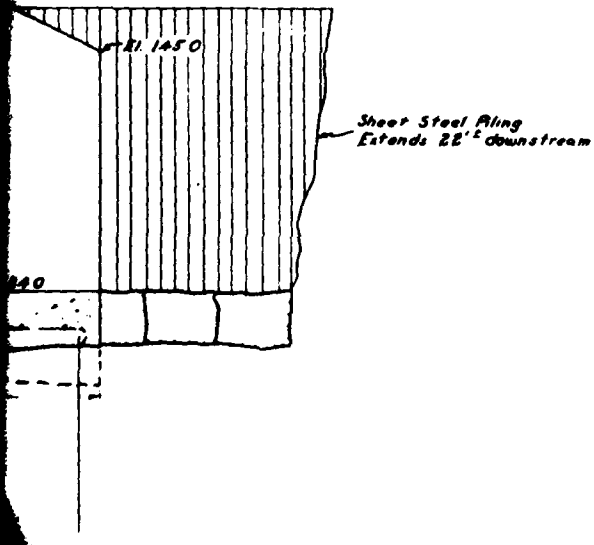


RETAINING WALL DETAIL





SECTION "B"-"B"



NOTE: ELEVATIONS SHOWN ARE BASED ON ANACONDA, ANSONIA PLANT DATUM

ANACONDA DATUM -97.45' = USGS DATUM

Concrete shall be proportioned to obtain a compressive strength of 3,000 p.s. at 28 days and a 2"-3" slump Use 1½" coarse aggregate if available.

HALF SIZE

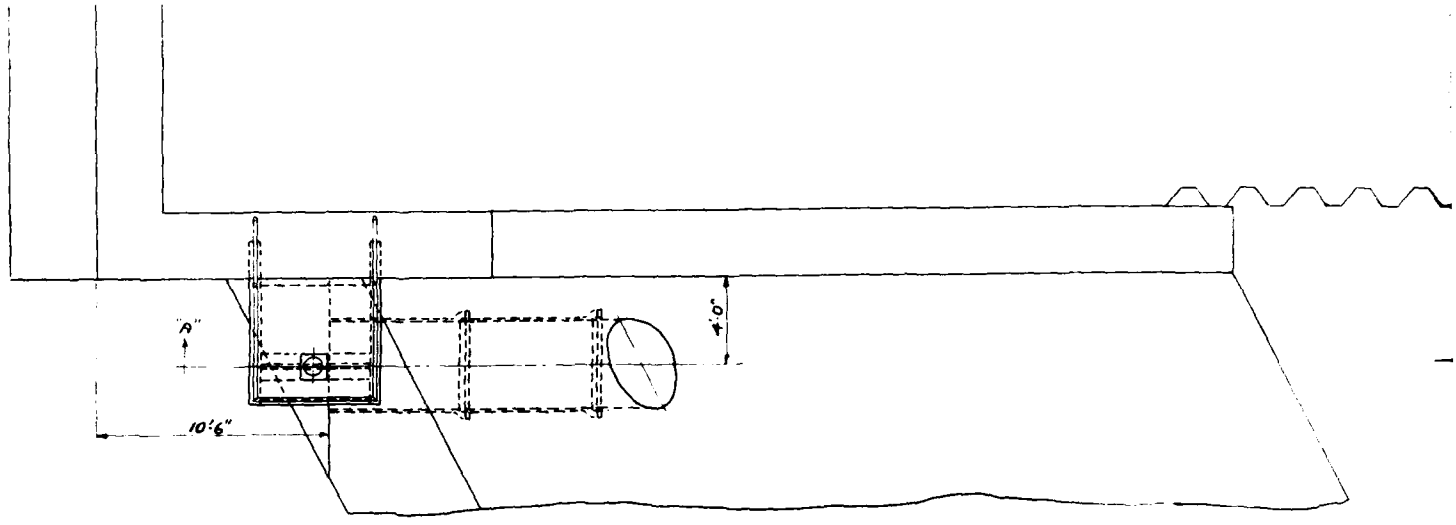
DATE	REVISIONS
10-10-55	Gen Rev
10-13-55	Section B-B
10-24-55	Concrete Note
11-10-55	Gen Rev
11-16-55	Dimension on East Abutment
10-11-57	Retaining Wall

DETAILS OF EAST ABUTMENT
KINNEYTOWN DAM
ANSONIA DIV - SEYMOUR CONN.

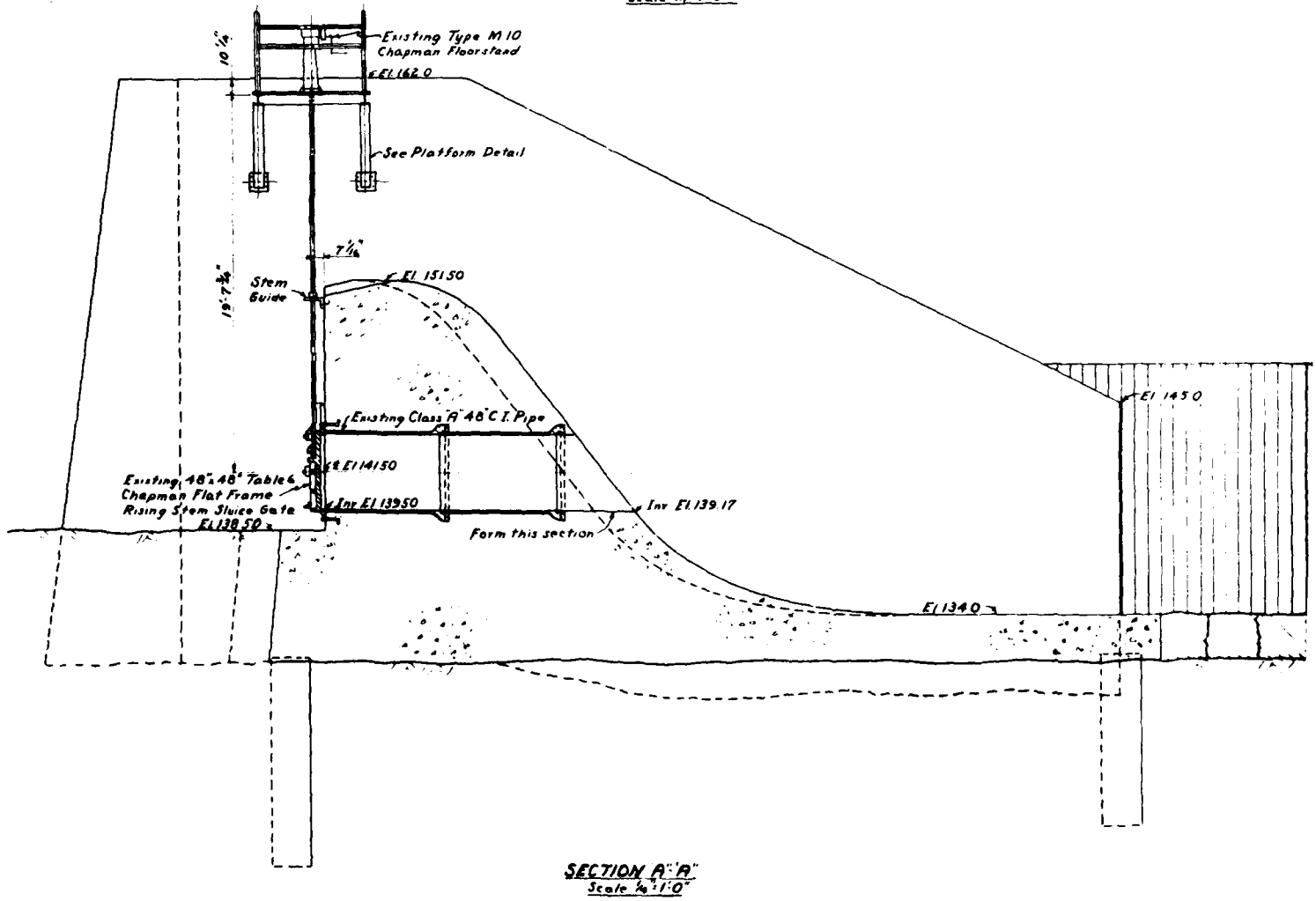
THE AMERICAN BRASS CO.
Engineering Dept Waterbury Conn

DRAWN BY J T M DATE Sept 30, 1955
TRACED " J T M " Oct 11, 1957
CHECKED " "
APPROVED " "
SCALE ½" = 1'-0"

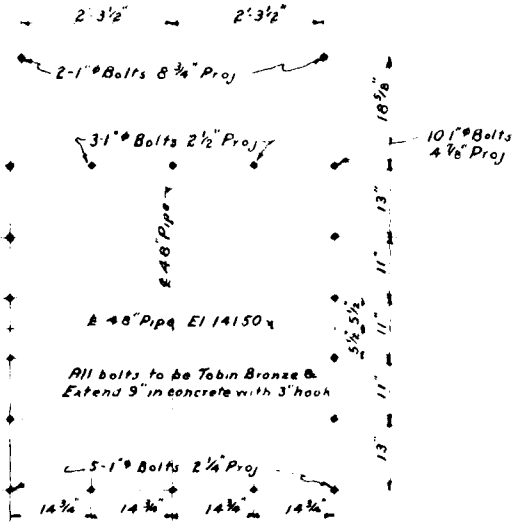
B-5



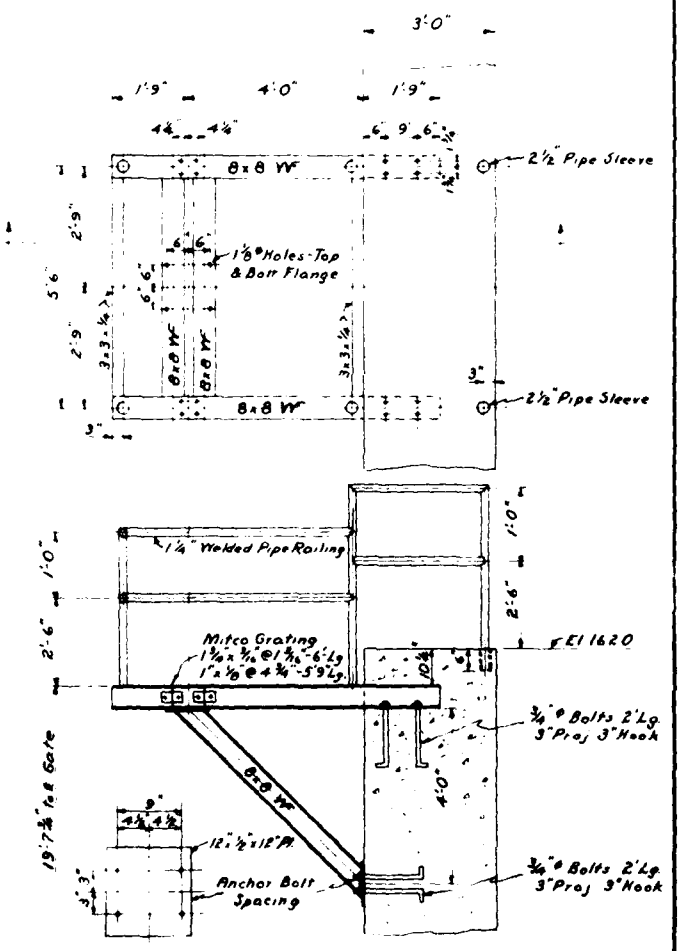
PLAN AT EAST ABUTMENT
SHOWING DRAWOFF PIPING
Scale 1/4"=1'-0"



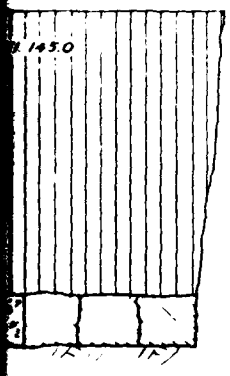
SECTION A-A
Scale 1/4"=1'-0"



SLUICE GATE
ANCHOR BOLT DETAIL
Scale 3/4"=1'-0"



DETAILS OF FLOORSTAND PLATFORM
Scale ½"=1'-0"



NOTE: ELEVATIONS SHOWN ARE BASED ON ANACONDA, ANSONIA PLANT DATUM
ANACONDA DATUM 97.45' USGS DATUM

DATE	REVISIONS
10-14-57	As Installed

DETAILS OF DRAWOFF PIPING
KINNEYTOWN DAM
ANSONIA DIV - SEYMOUR CONN
THE AMERICAN BRASS CO.
Engineering Dept - Waterbury Conn

DRAWN BY J T M DATE Nov 18 1955
TRACED J T M Oct 14, 1957
CHECKED
APPROVED
SCALE As Noted

B-6

THE ANSONIA LIBRARY

ANSONIA, CONNECTICUT

NEW CONCRETE DAM AT KINNEYTOWN FINISHED

ONE OF THE BEST AND STRONGEST OF ITS KIND BUILT IN THE STATE

Contains Over 4,000 Yards of Rubble Concrete - Replaces Structure Erected Sixty-five Years Ago - Big Factor in Ansonia's Industrial Life.

The final work on the new concrete dam, erected in the Naugatuck River, to take the place of the one washed away by the freshet last winter, marks the completion of one of the best structures of its kind built in Connecticut in recent years. Situated directly south of the Old Kinneytown Dam, the new structure, staunchily built of 4,000 cubic yards of rubble concrete reinforced by steel, is a lasting structure.

From abutment to abutment, it measures about 240 feet in width. In height it varies, but averages about 18 feet from the bed of the river in front. It is set entirely on ledge rock, at some places 10 to 12 feet below the bed of the reservoir. Its peculiar curved front allows the water to fall practically noiseless, and without vibration to the cup below, without any danger of undermining the foundation. It differs somewhat in shape from the old Kinneytown structure, having an apron measuring 40 feet from edge to edge. Across the top the dam measures at the average, eight feet.

AN IMPORTANT STRUCTURE

The new dam is one of the most important factors in the industrial life of Ansonia. It will furnish water for the canal of the American Brass and Copper Company, which was at one time the principal source of power in local manufacturing circles. The old Kinneytown Dam, the place of which the new structure takes, was constructed about 65 years ago. The dam was at first intended to supply water for a canal, leading to the mills in Derby. When Anson G. Phelps started his copper mill in Ansonia in 1844, the dam was used to supply the water for the canal which has since supplied water power to the principal manufacturing concerns in the city. In 1848 the Farrel Foundry was started, and the other mills, Phelps & Bartholomew, Wallace & Sons, The Ansonia Electric Co., and John B Gardner & Sons, were next in line. All these plants were furnished water power by the canal.

The old Kinneytown Dam was built along old plans, of logs and lattice fashion. The innerworks were of dirt and stone. It was a crude structure, but weathered many a flood until one big freshet which caused so much damage on Jan.22,1910. This freshet which badly damaged the Bridge Street Bridge, the railroad trestle just south of it, and other minor structures, carried the old dam away, and for weeks the work of mills was interferred with. Temporary repairs were immediately made by C.M.Blakeslee & Sons, the New Haven contractors and four weeks later a temporary

wooden or coffer dam was built just south of the old structure and the canal again filled.

COMPLETED BEFORE CONTRACT TIME

The contract for the construction of the new concrete dam was closed on August 4, of last year. Work on the proposed dam was started on Aug.15, The terms of the contract called for completion of the work on November 24. Blakeslee & Sons had the dam proper built on Nov.15., about a week prior to the date set in the contract. Since that time much grading and final detail of the work has been going on. The entire job is now about completed, though a few minor repairs about the place will continue until well onto spring. The new dam is several feet below the site of the old structure. Hundreds have visited the place within the last few weeks.

from Sentinel March 1, 1911

Note: Owned by the Ansonia Land & Water Power Company Hydroelectric Station at the old Copper Mill on Main Street installed in 1913.

Copied verbatim from Anaconda American Brass Co. records, December 21, 1979, by Roald Haestad, Inc.

April 15, 1924.

Report on conditions existing
at Kinneytown Dam during the flood of April 7, 1924.

MR. W. A. COWLES, Vice President,
ANSONIA BRANCH

Dear Sir:

Due to the heavy rain during the night of April 6th and 7th, and the saturated condition of the ground in the Naugatuck Valley, the river commenced to rise very rapidly about 5 o'clock in the morning. At 7 o'clock there was about 7 ft. of water over the crest of the Kinneytown Dam. The high water point was reached at about 11:30 A.M., when the water reached an elevation of 9 ft. over the top of the dam.

By 9:30 o'clock in the morning it was seen that there might be trouble around the Gate House on the west side of the dam. A blockade of sand bags was built on the east side of the Gate House to raise the bank at this point. We also drove a line of stakes along the bank on the west side of the river, placed a plank against them, and packed them down with sand bags. The river rose to a heighth of an elevation of 158.51 - at which point the preparations which had been made were called upon to do service.

The money spent for the work done on the head gates in the Fall of 1921 was very well invested, as without the concrete bottom under the head gates, and the sheet steel piling which was driven across the bottom and into the banks on each side, we would undoubtedly have had the whole Naugatuck River into the canal. The sheet steel piling which is driven east from the canal undoubtedly saved this bank, as the strain upon the head gates and bank was terrific, as there was a difference of over 12 ft. in water levels. Water was coming through the wall on the east side under the Gate House, south of the gates, and this bank was saturated with water so that at its foot on the down stream side you could see the water running out of the ground. If it had not been for the sheet piling driven into this bank, it is a question whether the whole section of the bank would not have slid out. We were very fortunate that the water did not rise another foot in heighth.

We would recommend that the wall north of the Gate House on the east side be raised to the same heighth as wall on the west side, and that the top of the sheet piling which is driven into the bank be capped to

Mr. W. A. Cowles, Vice President,
Ansonia Branch

the same heighth. This would prevent any water getting into the bank on the down stream side of sheet piling, and prevent any danger of water flowing across the bank.

We are attaching to this report a blueprint, 6515-10, which shows the plan and elevation at the dam and Gate House, also the elevation of the land at these points.

We are sending a copy of this letter and print to Mr. J. R. Coe.

Yours very truly,

WFW:W
Encl.

Mechanical Supervisor-Ansonia Branch

A. M. McKENZIE
CIVIL ENGINEER
M. AM. SOC. C. E.

HYDRAULICS
WATER SUPPLY
LAND DEVELOPMENT

1300 MAIN STREET
SOUTH MANCHESTER, CONN.

April 20, 1960.

Water Resources Commission,
State of Connecticut,
State Office Building,
Hartford, 15,
Connecticut.

Ref: American Brass Co., Kinnegtown Dam, Naugatuck River, Ansonia. Ansonia Quad.

Gentlemen:

Following the instructions in your letter of March 16, I have inspected the above Dam and submit the following report for your files.

The Dam is actually a diversion structure on the Naugatuck River for the purpose of getting the stream into a canal from which it is drawn, at the Company's power plant about a mile downstream, for power and industrial purposes. During ordinary stages of the river the entire flow is diverted into the canal. On the inspection date, April 15, there was only a very small amount of water coming over the dam thru leaks in the flash boards.

The Dam is a substantial concrete structure 400' long on the crest with a height of 17.5' above the downstream apron. It has two angles at approximately the third points which gives it a very much flattened "S" shape in plan. See sheet 6515-35. 170' of the east end, which is part of the new construction of 1955-56, is of poured concrete; the 230' of the west side is of rubble concrete using large boulders and was built about 1910. This 230' section has a 24" flash board on the crest to raise it at the same elevation as the new construction. The entire length of the dam is a spillway. At the east end of the dam there is a forebay 120' long with a gate house in which there are five sliding gates to control the flow of water into the canal.

For about 400' below the dam the 50' wide canal parallels the river and is separated from it by the railroad embankment which is 50 wide on top and about 10' above the crest of the dam. On the river side the RR. embankment is supported by dry, rubble stone wall and on the canal side there is 100' of sheet steel piling. The RR. is carried over the forebay on a 2 span plate girder bridge.

A M McKENZIE
Civil Engineer
M. Am. Soc. C. E.

HYDRAULICS
WATER SUPPLY
LAND DEVELOPMENT

1000 Main Street
South Glastonbury, Conn.

At the toe of the dam there is a concrete apron the full distance between abutments; this varies in width from 13 feet at the east end to 40' at the west end and is up to 5' thick where exposed. Just below the apron there is a considerable area of exposed ledge rock in the channel and the rest of the river bed is covered with large and small boulders - see photo #2-A. Apparently all of the usable sand and gravel has been excavated from the river bed downstream.

The wing walls at both ends of the dam are of sound concrete 4' thick. At the west end there is a section of earth fill, perhaps 50' long, which is well protected upstream by a concrete retaining wall. About 100' west of the west end of the dam is an approach road to the recently constructed Route #8 and 100' further west is the edge of the north bound lane of Route #8. The approach road is about 2' higher than the top of the wing wall and Route #8 maybe 20' above the wing wall.

At the east end of the dam, very close to the wing wall, is a cast iron pipe drain thru the dam 48"ϕ and controlled by a sliding gate upstream. See photo # 12-A and print 6515-38.

HISTORY

Prior to 1910 there was some sort of a log crib dam in the same locatio as the present structure. Attached to this report are four prints - 6515-2, 3, 35 and 38; the first two show details of the dam built about 1910 and the other two give details of the repairs and construction shortly after the great flood of August, 1955. As far as I can tell the present structure is according to the details on sheets 35 and 38 and the photographs confirm this.

Water Supply Paper #1671, published in 1964, has a record of all floods on the Naugatuck River from 1920 thru 1960, from a gauging station at Beacon Falls about 5 miles above Kinneytown Dam. The greatest flood recored here on August 19, 1955, which may be considered as a 300 year flood, is 106,000 c.f.s. The drainage area above the gauging station is 261 square miles (Prior to 10/1/55 is was 246 sq. mi.) and, adding the approximate area between Beacon Falls and the dam, there will be a total of about 290 square miles. Based on the discharge per square mile in 1955 the flow at the dam might have been about 125,000 c.f.s. Making an approximate calculation based on this flow the depth over the present dam would be about 20'

A M McKENZIE
Civil Engineer
M. Am. Soc. C. E.

HYDRAULICS
WATER SUPPLY
LAND DEVELOPMENT

1000 Main Street
South Manchester, Conn.

Using the data on pages #3 and #4 of Paper #1671 the annual flood on the Naugatuck River at the dam location might be about 10,000 c.f.s. and the 100 year flood, from Fig. 5 on page 5 would be 5 times the mean annual or 50,000 c.f.s. Carrying the calculation farther to arrive at the depth of water over the present dam with a discharge of 50,000 c.f.s. is the following:

$Q = C L H^{\frac{3}{2}}$ where $Q = 50,000$

$C = 3.5$

$L = 400'$

$50,000 = 3.5 \times 400 \times H^{\frac{3}{2}}$

or $1400\ H^{\frac{3}{2}} = 50,000$

$$H^{\frac{3}{2}} = \frac{50,000}{1,400} = 35.7$$

and $H = 10.8$ feet

Since the freeboard at both ends of the dam is 11.5 feet (see sheet #8) the dam seems reasonably safe for carrying a 100 year flood. Any discharge approaching that of 1955 would undoubtedly wash out all around the dam and produce the same havoc as that of 1955. Except for floods beyond those indicated by the above figures there is no hazard at all involved. The dam is in excellent condition, the design is safe and the maintenance is very good. It does not appear necessary to inspect the dam at intervals of less than ten years or after an unusual flood.

Yours very truly

A. M. McKenzie.

Enclosure: Photos #6, #7, #8, #9, #10, #11
#1A, #2A, #3A, #5A, #6A, #7A, #8A, #10A, #11A, #12A
Prints 6515-2, -3, -35, -38.

APPENDIX C

PHOTOGRAPHS

FIGURE 2

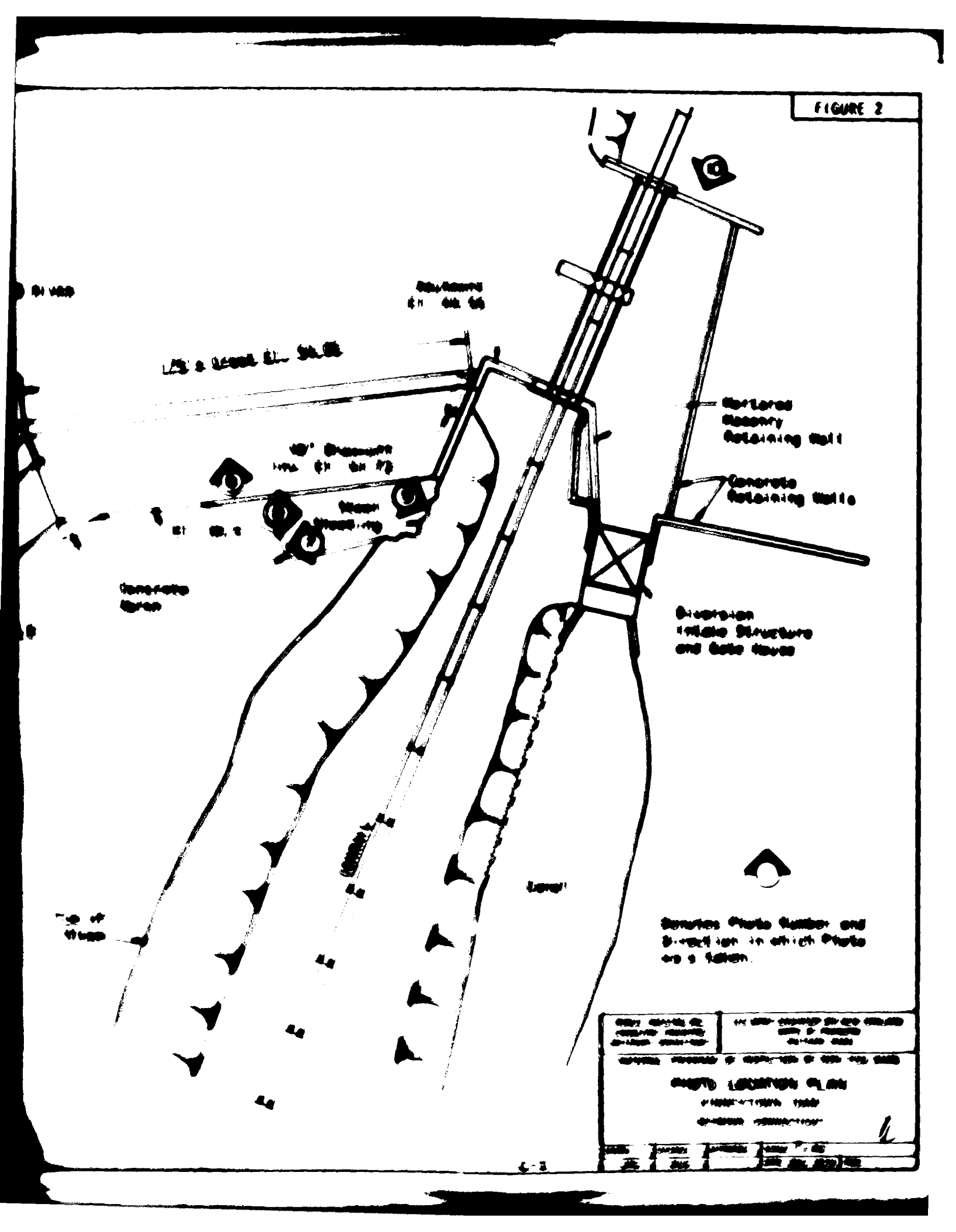

Dry-Laid Masonry Retaining Wall
Concrete Retaining Walls
Diversion Intake Structure and Gate House

PHOTO NO. 1

EROSION AND UNDERMINING AT RIGHT END OF SPILLWAY APRON, IRREGULARITIES IN FLOW OVER SPILLWAY

PHOTO NO. 2

UNDERMINING OF RIGHT END OF SPILLWAY APRON AND WALL

US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS FERRIS HAESTAD, INC. CONSULTING ENGINEERS GAITHERSBURG, CONNECTICUT	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	KINNEYTOWN DAM NAUGATUCK RIVER SEYMOUR, CONNECTICUT CT 00089 DATE: 13 DEC '79

PHOTO NO. 3

SURFICIAL SLOUGHING FAILURE OF
RIGHT BANK BELOW SPILLWAY APRON

PHOTO NO. 4

RIGHT SPILLWAY SECTION.
NOTE CRACK IN APRON AND POSSIBLE
MISSING SECTION OF APRON IN RIGHT SIDE OF PHOTO

U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	KINNEYTOWN DAM NAUGATUCK RIVER SEYMOUR, CONNECTICUT CT 00089 DATE: 13 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 5

DOWNSTREAM END OF RIGHT TRAINING WALL. NOTE SPALLING, EFFLORESCENCE AND UNDERMINING

PHOTO NO. 6

SPALLING AT A CONSTRUCTION JOINT IN THE LEFT SPILLWAY SECTION

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	KINNEYTOWN DAM NAUGATUCK RIVER SEYMOUR, CONNECTICUT CT 00089 DATE: 13 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 7

DETERIORATION OF CONCRETE APRON DOWNSTREAM OF LEFT SPILLWAY SECTION

PHOTO NO. 8

STEEL SHEET PILE WALL DOWNSTREAM OF LEFT TRAINING WALL

U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	KINNEYTOWN DAM NAUGATUCK RIVER SEYMOUR, CONNECTICUT CT 00089 DATE: 13 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 9

CLOSE UP OF SEEPAGE THROUGH STEEL
SHEET PILE WALL, SHOWN IN PHOTO NO. 8

PHOTO NO. 10

APPROACH CHANNEL AND INTAKE
STRUCTURE FOR DIVERSION CANAL

U.S ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	KINNEYTOWN DAM NAUGATUCK RIVER SEYMOUR, CONNECTICUT CT 00089 DATE: 13 DEC '79
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

BY ...J.L.S.... DATE ..11-3-72.... **ROALD HAESTAD, INC.** SHEET NO ....1..... OF ....7.....

CONSULTING ENGINEERS

CKD BY WSH. DATE ..12/18/72. 37 Brookside Road - Waterbury, Conn 06708 JOB NO ...049-07.....

SUBJECT .....KINNEYTOWN DAM.....

WATERSHED AREA = 300 sq. mi.

WATER SURFACE AREA = 68 ACRES

STEEP SIDE SLOPES AND DAM AT UPSTREAM

END CAUSE WATER SURFACE TO REMAIN CONSTANT

AT ALL POOL ELEVATIONS.

AVERAGE DEPTH OF IMPOUNDMENT ESTIMATED IS FEET

STORAGE AT SPILLWAY LEVEL = 68 Ac. x 15 Ft. = 1020 Ac-Ft.

HEIGHT OF ABUTMENTS ABOVE SPILLWAY CREST = 12.5 Ft.

SURCHARGE STORAGE = 68 Ac x 12.5 Ft. = 850 Ac-Ft.

TOTAL STORAGE AT TOP OF DAM = 1020 + 850 = 1870 Ac-Ft

SPILLWAY CAPACITY

SPILLWAY SECTION	LENGTH	ELEV.	COEF	CAPACITY CFS
OLD SPILLWAY (1910)	238'	52.05	3.6	37,900
NEW SPILLWAY (1956)	175'	54.05	3.6	21,400
ABUTMENTS	280'	64.55	2.7	0

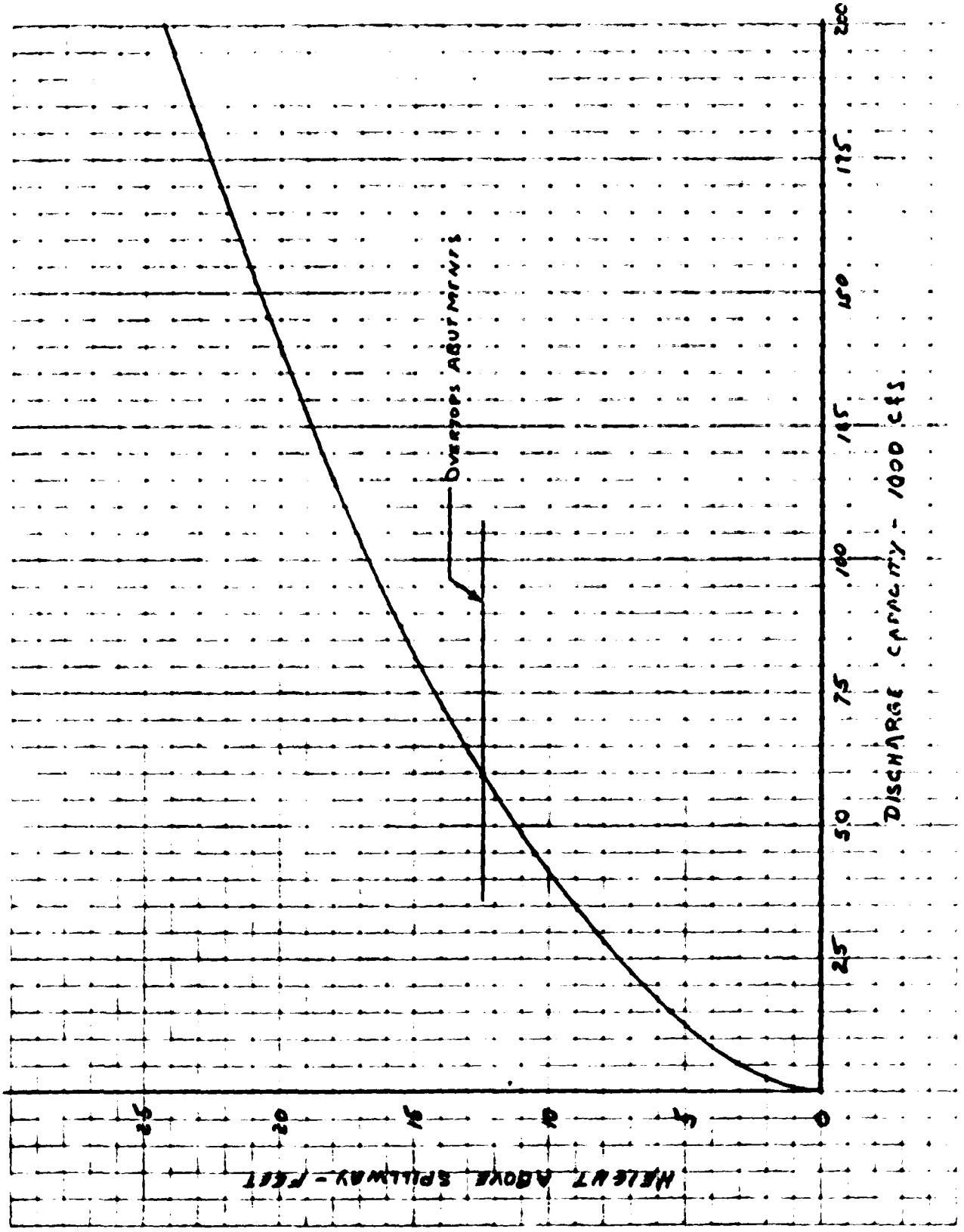
SPILLWAY CAPACITY AT TOP OF DAM = 59,300 CFS

BY ...DMS..... DATE ..12/16/79.... **ROALD HAESTAD, INC.** SHEET NO ...2..... OF .....7.....

CONSULTING ENGINEERS

CKD BY MSH DATE ..12/18/79.. 37 Brookside Road - Waterbury, Conn 06708 JOB NO ...C-49-C2.....

SUBJECT .....KINNAYTOWN SPILLWAY DISCHARGE CURVE.....



BY DLS DATE 11-2-79 **ROALD HAESTAD, INC.** SHEET NO 7 OF 7

CONSULTING ENGINEERS

CKD BY RHA DATE 12/18/79 37 Brookside Road · Waterbury, Conn. 06708 JOB NO 79-03

SUBJECT KINNEYTOWN DAM - TEST FLOOD = ½ PMF

WATERSHED AREA = 300 sq. mi.

FROM CHART "MAXIMUM PROBABLE FLOOD PEAK FLOW RATE"

TERRAIN "ROLLING" q = 650 CFS/sq mi

Q_{p_1} = 300 sq. mi. × 650 CFS/sq mi = 195,000 CFS

AUGUST 1955 DISCHARGE AT DAM SITE = 17,000 CFS

UPSTREAM FLOOD CONTROL DAMS CONTROL

151.5 sq. mi. of the 300 sq. mi. watershed.

THESE FLOOD CONTROL DAMS ARE CONSIDERED TO HAVE A NEGLIGIBLE EFFECT ON THE PMF BUT ARE CONSIDERED 100% EFFECTIVE FOR THE ½ PMF AND SMALLER FLOODS.

½ PMF WATERSHED = 300 − 151.5 = 148.5 sq. mi.

"ROLLING" TERRAIN 148.5 sq. mi. = 650 CFS/sq. mi.

½ PMF = ½ (650 × 148.5) = 63,100 CFS

FLOOD ROUTING

Q_{p_1} = 63,000 CFS SURFACE AREA = 68 ACRES

SURCHARGE HEIGHT = 12.8 ft.

STOR$_1$ = SURCHARGE STORAGE = 12.8 × 68 = 870 Ac.-ft.

870 Ac.-Ft. = 0.1" RUNOFF FROM 148.5 sq mi.

$$Q_{p_2} = Q_{p_1}\left(1 - \frac{STOR_1}{9.5}\right) = 63{,}000\left(1 - \frac{0.1}{9.5}\right) = 62{,}300 \text{ CFS}$$

STORAGE HAS NEGLIGIBLE EFFECT ON DISCHARGE

PEAK OUTFLOW - ½ PMF = 63,000 CFS

BY DLS DATE 11-9-79 **ROALD HAESTAD, INC.** SHEET NO 4 OF 7

CONSULTING ENGINEERS

CKD BY WSP DATE 11/16/79 17 Brookside Road - Waterbury, Conn. 06708 JOB NO 79-03

SUBJECT KINNEY-IRVIN DAM - DAM BREACH ANALYSIS

STORAGE CAPACITY AT TOP OF DAM = 1870 Ac-Ft.

LENGTH OF DAM = 413 FT. HEIGHT OF DAM = 30 FT.

"RULE OF THUMB" DAM BREACH

$$Q_{p_1} = 8/27\, W_b \sqrt{g}\, y_o^{3/2}$$

W_b = BREACH WIDTH = 40% OF DAM WIDTH AT MID HEIGHT

$W_b = 0.40 \times 413 = 165.2$ FEET

y_o = HYDRAULIC HEIGHT OF DAM, STREAM BED TO POOL ELEVATION AT FAILURE

$y_o = 32.5$ FEET

$$Q_{p_1} = 8/27\,(165.2)\sqrt{32.2}\,(32.5)^{3/2}$$

$Q_{p_1} = 51,462$ CFS

SPILLWAY DISCHARGE AT TOP OF DAM = 59,300 CFS

AS DIRECTED BY CORPS OF ENGINEERS —

ASSUME 60% OF SPILLWAY CONTINUES FLOOD DISCHARGE AND ADD SPILLWAY FLOW TO DAM BREACH FLOW

TOTAL DAM BREACH FLOW = $0.60(59,300) + 51,500$

$= \underline{\underline{87,000 \text{ CFS}}}$

BY ... DATE ... **ROALD HAESTAD, INC.** SHEET NO 5 OF 7

CONSULTING ENGINEERS

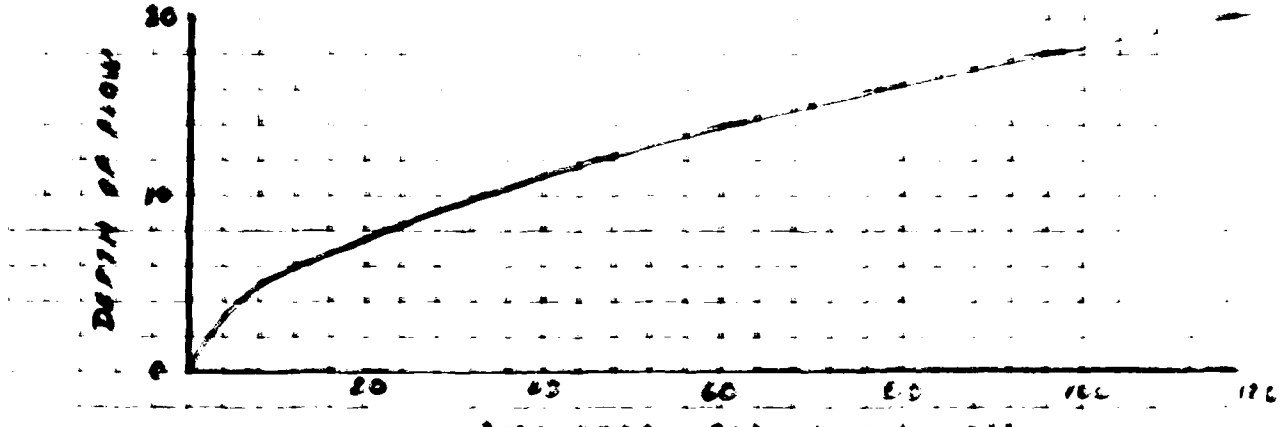
CKD BY ... DATE 12/18/79 ... JOB NO ...

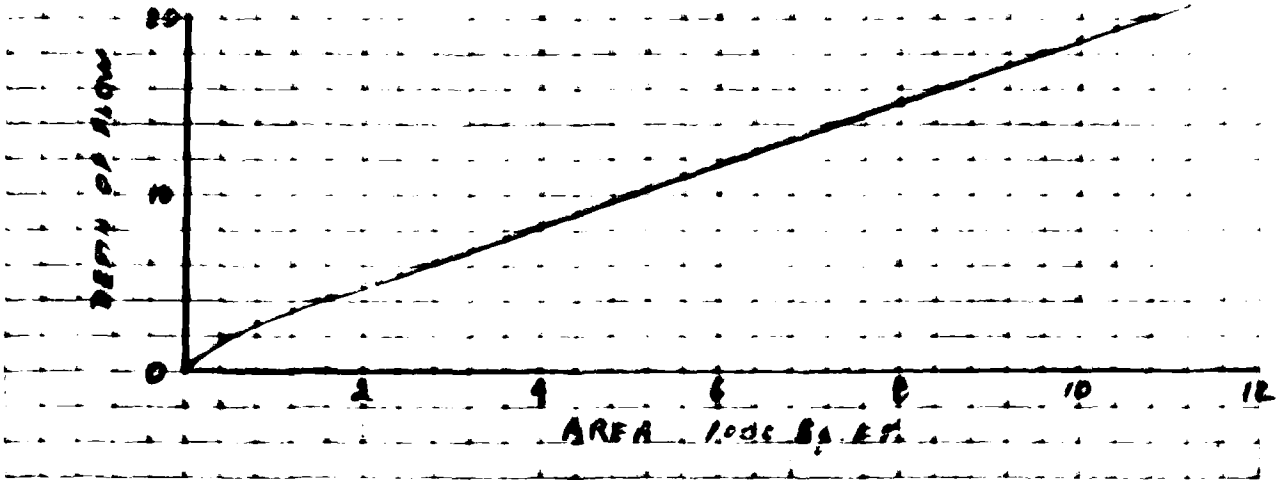
SUBJECT ...

SECTION 1

REACH ENGIN ...
S.F. 1½ ...
n = 0.013
S = 0.001

D	Wp	A	R	S	V	Q
5	530	2200	4.00	0.001	3.[illegible]	5500
10	590	5050	8.56	0.001	6.6	33,330
15	615	8650	13.04	0.001	8.7	75,255
19	640	11,150	17.42	0.001	10.5	117,075
22	815	15,260	18.71	0.001	11.2	171,272
[illegible]	990	20,900	21.11	0.001	11.8	246,720





BY D.A.S. DATE 11-16-79 **ROALD HAESTAD, INC.** SHEET NO. 6 OF 7

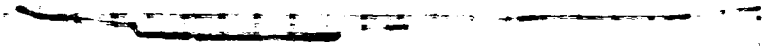
CONSULTING ENGINEERS

CKD BY W.S.P. DATE 12/18/79 17 Brookside Road - Waterbury Conn 06708 JOB NO. 049-03

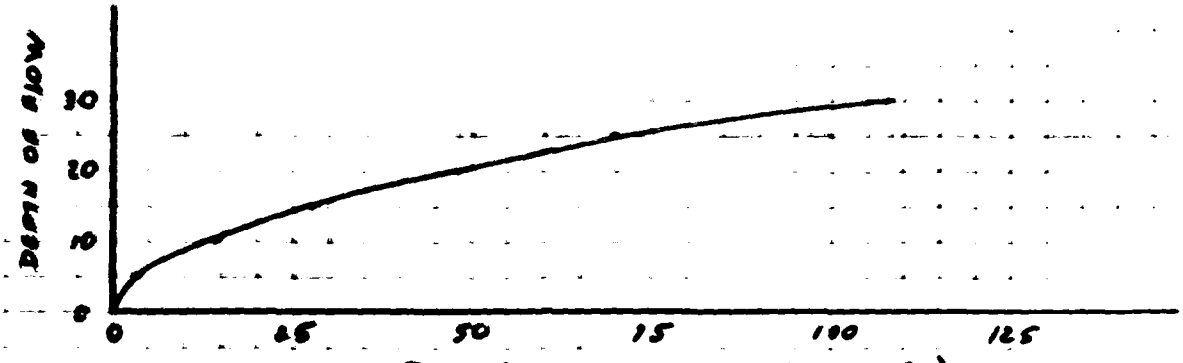
SUBJECT KINNEY TOWN DAM - FLOOD ROUTING

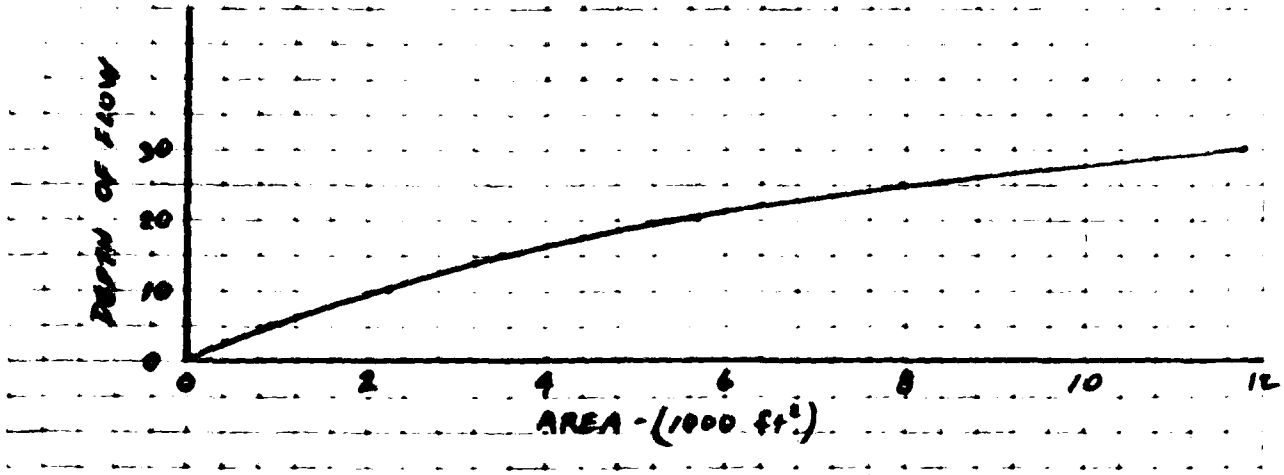
SECTION 8 ABOVE FLOOD CONTROL WORKS

SCALE 1" = 200'
REACH LENGTH = 3000'
n = 0.03
S = 0.001



ELEV	Depth	Width	Area	R(ft)	S	Vel	Q(cfs)
5.0	5	230	925	4.02	0.001	4.0	3700
	10	275	2225	8.09	0.001	6.3	14,018
4.0	15	315	3525	11.19	0.001	7.6	27,495
	20	455	5725	12.58	0.001	8.5	48,663
5.0	25	515	7525	13.32	0.001	8.6	69,740
	30	595	11,850	13.92	0.001	9.1	107,390





[illegible]

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

DAM FAILURE FLOOD LIMITS

KINNEYTOWN DAM

REVISED, CONNECTICUT

DRAWN	CHECKED	SURVEYED	SCALE 1" = 2000'
JRS	PLB		DATE DEC 1979 FILE

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST	(7) STORE	(8) COUNTY	(9) CONGR DIST	(10) NAME	(11) LATITUDE (NORTH)	(12) LONGITUDE (WEST)	(13) REPORT DATE DAY | MO | YR
CT	99	NED	09	009	05				KINNEYTOWN DAM	4122.1	7305.1	28DEC79

(14) POPULAR NAME	(15) NAME OF IMPOUNDMENT
	NAUGATUCK RIVER

(16) REGION	(17) BASIN	(18) RIVER OR STREAM	(19) NEAREST DOWNSTREAM CITY-TOWN-VILLAGE	(20) DIST FROM DAM (MI)	(21) POPULATION
01	07	NAUGATUCK RIVER	ANSONIA	1	20000

(22) TYPE OF DAM	(23) YEAR COMPLETED	(24) PURPOSES	(25) STRUCTURAL HEIGHT (FT)	(26) HYDRAULIC HEIGHT (FT)	(27) IMPOUNDING CAPACITIES MAXIMUM (ACRE-FT)	(27) IMPOUNDING CAPACITIES NORMAL (ACRE-FT)	DIST	GRN	FED	H	PHV/FED	SCS	A	VER/DATE
ECT	1910	HS	32	32	1900	1000	NED	N		N		N		

(28) REMARKS
22 DAM REP 1956 23 PROCESS WATER SUPPLY 24 NOT INCLUDING CUTOFF

(29) D/S HAS	(30) SPILLWAY CAP/LENGTH	(30) SPILLWAY TYPE	(30) SPILLWAY WIDTH (FT)	(31) MAXIMUM DISCHARGE (CFS)	(32) VOLUME OF DAM (CY)	(33) POWER CAPACITY INSTALLED (MW)	(33) POWER CAPACITY PROPOSED (MW)	(34) NAVIGATION LOCKS NO	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)	LENGTH (FT)	WIDTH (FT)
2	413	U	413	54000	6500	.7										

(35) OWNER	(36) ENGINEERING BY	(37) CONSTRUCTION BY
THE ANACONDA COMPANY	AMERICAN BRASS CO	MARIANI CONSTRUCTION CO

(38) REGULATORY AGENCY DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
CT DEP	CT DEP	CT DEP	CT DEP

(39) INSPECTION BY	(40) INSPECTION DATE DAY | MO | YR	(41) AUTHORITY FOR INSPECTION
ROALD HAESTAD INC	13DEC79	PL92-367

(42) REMARKS
47=ORIG SEC JOHN N COOK 48=ORIG SEC C W BLAKESLEE & SONS

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